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CLIENT/SERVER JOURNAL

AUGUST 1995

a look into the labs

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ALSO IN THIS ISSUE:

- NETWORK MANAGEMENT'S DOLLARS & SENSE
- THE CASE FOR SERVER CONSOLIDATION
- NOVELL SEEKS ENTERPRISE ROLE

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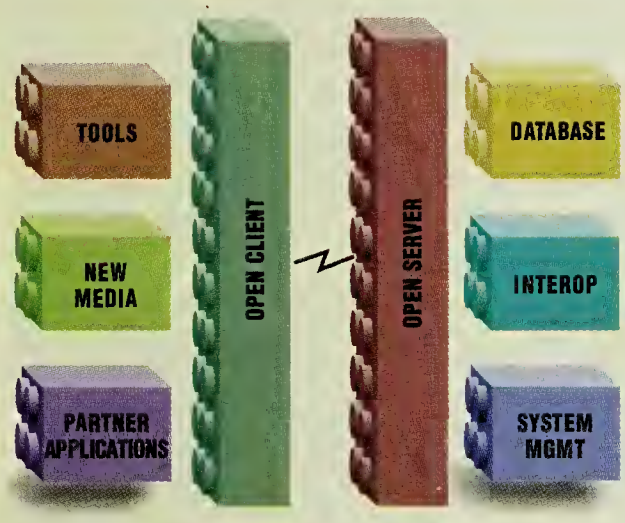

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COMPUTERWORLD

CLIENT/SERVER JOURNAL

AUGUST 1995

COVER STORY

a look into the labs

34 What form will distributed computing take in the first decade of the next millennium? No keyboard? No GUI? No wires? No procedural coding? No grief? Perhaps. More to the point, next-generation distributed systems will allow globally dispersed business associates to collaborate as if they're physically in the same room. Information will be distributed via on-line, interactive services and cable television. And some of us will carry or wear the computer of our choice (color coordinated, of course). A peek into university and vendor technology incubators provides an intoxicating whiff of what these and other developments will engender over the next 10 to 15 years.
By Alice LaPlante

COVER ILLUSTRATION BY HAROLD LEE MILLER

NETWARE

Which Way, Novell?

20 Novell NetWare and local-area networking have become synonymous. But the file-and-print champion faces its fiercest battle to date: recasting itself as a top supplier of enterprisewide, distributed computing platforms. Novell's shortcomings: acquisition indigestion, a porous applications server strategy and a groundswell of support for NT Server. Its strengths: NetWare's robust directory services, a huge installed base and a growing groupware presence.
By Laura DiDio

SERVER CONSOLIDATION

Centralization Strikes Again

28 The old axiom "add an application, add a server" doesn't always resonate at companies with growing client/server environments. Appalled at the explosive cost and complexity of managing geographically distributed environments, some are deploying fewer, larger servers that can handle more processing and more applications.
By Avery Johnson

ORGANIZATIONAL ISSUES

Great Expectations . . . Lesser Results

42 It's a common dilemma facing IS managers worldwide: keeping user expectations of new client/server systems in line with what can be delivered. A word to the wise: Communicate performance and functionality trade-offs as they arise, and educate, educate, educate.
By Steve Alexander

COMPUTERWORLD

CLIENT/SERVER JOURNAL

ADMINISTRATION

The Dollars And Sense Of Network Management

46 In today's distributed environments, you don't *buy* a network management system — you build one. And the essential ingredients are good people, innovative processes and increasingly automated and intelligent products.

By Mary Brandel

INTERVIEW

Aiming High, Shooting Low

52 Frank Moss is leading Tivoli Systems, Inc.'s quest to resolve client/server computing's Holy Grail: end-to-end distributed systems management.

By Alan Alper

VERTICAL MARKET: INSURANCE

Covering Their Assets

56 Better late than never, insurers are embracing data warehousing to more proactively spot trends, lower costs and boost profits. This means disassembling stovepipe systems and building new applications that provide cross-functional access to business-critical information.

By Mary Brandel and Garrett DeYoung

CASE STUDY

Choosing A Fabric

62 Part 3 of our case study on Unifi, Inc.'s client/server migration: The textiles manufacturer chooses IBM and Oracle to play vital roles in helping to build its evolving enterprisewide, client/server environment.

By Alan Alper

CAREERS

The Burnout Syndrome

65 The never-ending demands of client/server computing are causing some information systems professionals to fray around the edges. Here are some ways to avoid becoming a crispy critter.

By Willie Schatz

ALSO IN THIS ISSUE

Find out why Skadden Arps, one of the world's largest law firms, trusted Lawson at http://www.lawson.com or 1-800-477-1357.

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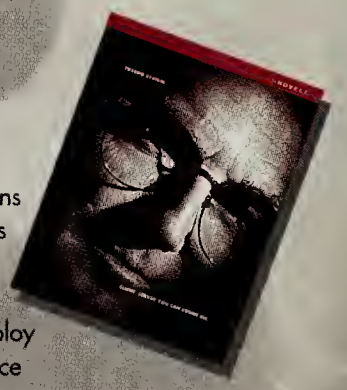

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Editor's Note

Baby, it's hot in here! And I'm not talking about the air temperature or some smoking new box. I'm referring to this issue of *Computerworld Client/Server Journal* and the pages devoted to industry efforts to make client/server computing more manageable.

Getting distributed systems and network management tools into some semblance of working order has taken almost half a decade. Unix wizards are no longer being asked to roll their own backup and recovery routines or network diagnostics. And the industry seems to be ushering in a new era of blended network and systems management (see Firing Line, page 68).

It's developments such as these that have many in-the-trenches IS professionals believing that network systems management may finally be on the right track. But as distributed systems get more complex, technology elixirs can offer only so much relief. As Mary Brandel points out in her article, "Dollars and Sense of Network Management" on page 46, the most important part of distributed network management is a well-trained contingent of experts who can correlate the mind-bending array of filtered alerts that are necessary to remedy complex network ailments. That's an expensive proposition.

To demassify their networks, some organizations are simplifying their server architectures (see "Centralization Strikes Again," page 28). For these companies, the old adage "Add an application, add a server" is *verboten*.

And then there's the sheer lunacy of keeping your distributed systems, multithreaded processes and applications running like well-oiled machines. Tivoli Systems, Inc. appears to have made significant inroads getting third parties and IS comfortable with its systems management framework (see "Aiming High, Shooting Low," page 52). But as Tivoli CEO Frank Moss says, the industry still faces some thorny obstacles when it comes to managing applications, administering remote clients and managing the interaction of the Internet with corporate computing applications.

These problems — and many others — will test the mettle of our industry's hothouses (see "A Look into the Labs," page 34). Clearly, their experimentation into intelligent agents, object-oriented computing and graphical user interfaces will be key in making client/server more manageable and more mainstream in the future.

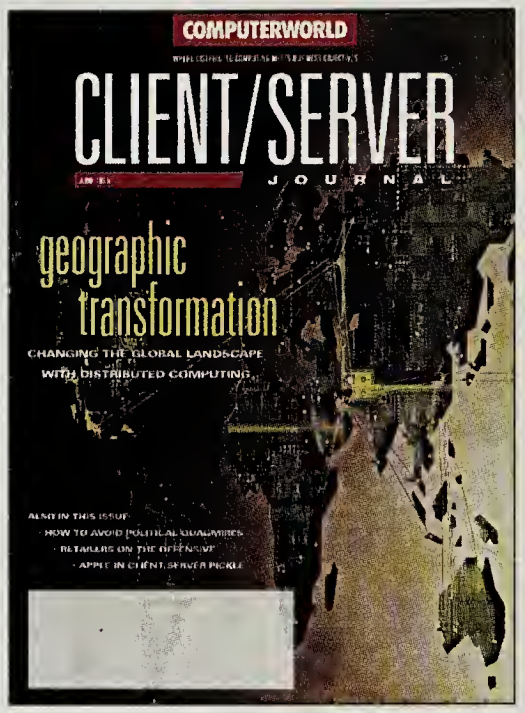
ALAN ALPER

MANAGING THE INTERACTION OF THE INTERNET WITH CORPORATE COMPUTING APPLICATIONS WILL TEST THE METTLE OF OUR INDUSTRY'S HOTHOUSES.

INTERNET: aalper@cw.com

PHOTOGRAPHY BY JACK FOLEY; COLORIZING BY LARRY GOODE

Letters



JUST READ AN ARTICLE CALLED "New Age Interfaces" in your *Client/Server Journal* June 1995 issue. I was wondering where I can get certified by the Board of Certification in Professional Ergonomics as well as how to get more information about it. Thank you.

TRUMAN CHUA
Senior software engineer
IDA, Inc.
Melrose Park, Ill.
truman@ida.com

Editor's reply: The Board of Certification in Professional Ergonomics can be reached at P.O. Box 2811, Bellingham, Wash. 98227-2811. The phone number is (360) 671-7601.

I LIKE THE WORK YOU DID FOR the *Client/Server Journal* "In Pursuit of Client/Server Excellence" issue. I thought the presentation of the subject was elegant and interesting, particularly with the inclusion of the Vital Statistics column with each story. Keep up the excellent work.

JAY WOODRUFF
Manager, corporate communications
Distributed Technologies Corp.
Waltham, Mass.
CompuServe: 7600,3603

I READ YOUR ARTICLE ABOUT Fannie Mae in the special June 1995 issue and have these questions: In this article you referenced another article concerning mortgage banking — CSJ, February 1994. How can I get a copy of this article?

You wrote little about the software, MornetPlus, that was used in this endeavor. I am interested to know if this product is a development tool or third-party application.

I appreciate any response you can offer. It is encouraging to hear some success stories in this area.

Thanks much.

CLETE SMITH
Programmer/Analyst
AllTel Information Services
Mortgage Banking Division
Jacksonville, Fla.
roadsta@jax.jaxnet.com

Editor's reply: MornetPlus is a homegrown application suite written with Visual Basic and C++. All Client/Server Journal *articles can be ordered via* Computerworld, *Inc.'s Rapid Reference service. Call (800) 343-6474, ext. 554, or E-mail rapidref@cw.com.*

I AM NOT IN THE BUSINESS WORLD yet. I am a junior at West Liberty State College in West Liberty, W. Va. My major is in business administration with a specialization in computer information systems.

I would like to take this time to tell you what a great learning tool *Client/Server Journal* is to me. I am always a step ahead of the other students in my computer classes, and that spells higher grades, which in turn means a better job when I get out of school. Please tell all your writers and other employees that they are doing a great job.

JEFF GORTNEY
jagortney@aol.com

Editor's reply: We're truly pleased that Client/Server Journal *is viewed as a powerful instructional tool.*

I JUST RECEIVED A FAX COPY OF the Nationwide article on page 34 of your June 1995 special issue of *Computerworld Client/Server Journal*. We're the workflow and document management application developer and supplier to Nationwide. Thanks for the mention. It was a great article.

RAY NAFZIGER
Marketing manager
JTS Systems
Mississauga, Ontario, Canada

I AM A SENIOR CONSULTANT (installer and implementer) at a small software house that is trying to move our product set onto client/server platforms. I am continually being asked for my preferences for tools and enablers as part of this effort. When *Client/Server Journal* was started, I looked forward to it eagerly, assuming *Computerworld*'s experience (and yours) would produce a useful magazine, worth my money and (more important) time. The June issue confirms my disappointment.

The basic problem seems to be that "freelance writers" — professional wordsmiths — are writing these articles rather than professional codesmiths. In this magazine, it would not be appropriate to have code fragments. But discussions of

Please turn to page 10

COVER ILLUSTRATION BY MARY BONO

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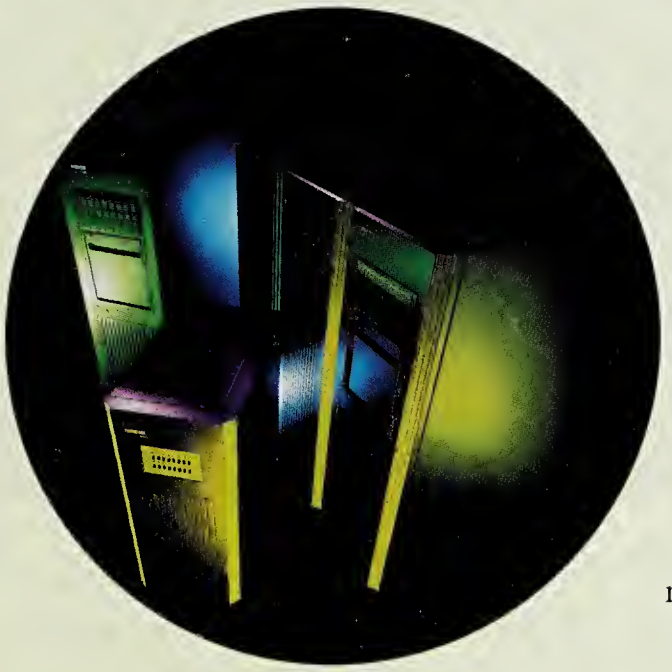

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THE STORAGE ARCHITECTS

Continued from page 8

real-world problems and solutions by the people who actually risked their jobs would be more useful than the "as told to" homogenized and grammatically correct pablum of this issue.

At this point, I do not consider *Client/Server Journal* a useful addition to my *Computerworld* subscription. Please, let's hear from those who do, not just those who watch.

STEVEN L. NEWTON
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Editor's reply: It's hard sometimes to gauge how much technical detail to get into when your audience encompasses a wide range of informational needs and technical expertise. Our readers range from bit-twiddlers to CIOs, value-added resellers, consultants and business domain specialists. And when it comes to client/server, it's often tough to get people to tell it like it is (but that's no excuse).

We use freelance writers rather than professional codesmiths because they're apt to take a more objective view of technology decisions. They can be passionate about the subject but dispassionate about the technical choices and trade-offs.

We do run columns written by consultants, IS managers and practitioners. But we demand that these people be independent of any vendor organization and that they do not have an ax to grind.

Our mission is to balance style with substance. Computerworld*'s philosophy has always been that it's easier to teach journalists technology than it is to teach technologists how to write.*

I do take your criticism to heart and will endeavor to make sure we don't sacrifice substance for style

I AM A CLIENT/SERVER CONSULtant at AT&T GIS working in the Professional Services business unit and aligned to the Information Solutions group, primarily composed of a core group of consultants from the acquired Teradata Corp.

Our group concentrates on consulting engagements termed Enterprise Information Factory Consulting, which help customers build applications enabling users to integrate their specific business processes and operational systems with information in a data warehouse.

While reading "When Data Is Not Enough," [CSJ, April 1995], I wondered how you chose subjects for this article on data warehousing without mentioning an AT&T or Teradata customer. AT&T has built data warehouses in over 150 of the world's top companies and several of the largest production data warehouses. AT&T has implemented data warehouses in Sybase, Oracle, Informix 7.1 and Version 2 of the Teradata database running on the AT&T 3550 line of standard Unix processors.

My concern with your article was its lack of information on how far the field of data warehousing has advanced. I believe this may have limited your readers' expectations of the broad scope of data warehousing concepts and how they've been proved to improve many customers' performance.

ERIC KOHUT
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Editor's reply: Our story was intended to take a look at what some leading-edge companies are doing with business intelligence systems. It was not meant to be an all-inclusive treatment of the subject. We tried to examine the technology and business challenges in getting such systems to provide meaningful payoffs.

FYI: In our June 1995 feature on retailing (page 30), we mentioned a 2.7T-byte data warehouse that AT&T GIS recently deployed for Wal-Mart Stores, Inc.

REGARDING "N.Y. GOAL: MORE cleaner blood" in the April 1995 issue of *Client/Server Journal* Really interesting article — my skin crawled!

VAL STEPHEN
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Computerworld Client/Server Journal *will publish letters on relevant client/server computing issues. Letters will be edited for brevity and taste. Write Editor Alan Alper at 375 Cochituate Road, Framingham, Mass. 01701 or via Internet at aalper@cw.com, MCI Mail at 598-8002 or CompuServe at 72303,1037.*

COVER ILLUSTRATION BY KEVIN

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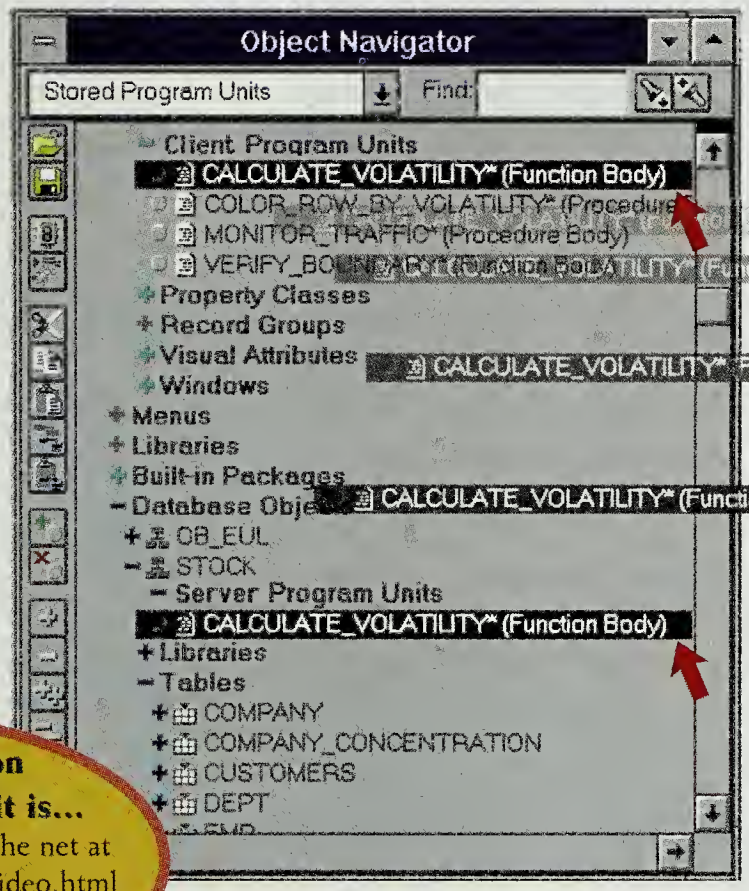

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INSIGHTS

A REVIEW OF CLIENT/SERVER VIEWS AND EVENTS

No More Rain Checks

Warner-Lambert achieves preferred supplier status with a new replenishment system

Jay Nearnberg claims Warner-Lambert's client/server inventory system has more than paid for itself in freight savings

Kmart shoppers will never have to go without Listerine — or any other product from the consumer health care division of Warner-Lambert, Inc. Well, at least 99% of the time.

Several times this year, the Morris Plains, N.J., manufacturer was granted Kmart Corp.'s "99 Club" award, a designation for suppliers that fulfill monthly inventory levels 99% of the time or more.

"When you prove you can execute the basics right, you become a preferred supplier," said Jay Nearnberg, director of partnership technologies at Warner-Lambert.

Partial credit is due to an OS/2-based, client/server, vendor-managed inventory system from Rockville, Md.-based Manugistics Group, Inc. Installed last October, the system is now being migrated to an Oracle Corp./Hewlett-Packard Co. setup.

It works like this: Kmart sends in daily sales updates and warehouse inventory balances, which the Warner-Lambert IS group combines with its inventory balances.

Replenishment analysts can then determine what actions to take and trigger an electronic data interchange order acknowledgment form that is sent to Kmart.

The IS group also runs weekly forecasts. Analysts can query inventory turns and promotion results. They also load the trucks using the deployment module. In fact, freight savings have paid for the $1 million system, Nearnberg said. By 1997, he expects annual savings of $2.2 million.

Warner-Lambert has been doing Kmart's replenishment since 1992. What client/server brings to the picture is growth potential (four retailers are now on the system, with 30 more expected), exception-based reporting and integration potential with other systems, such as SAP America, Inc.'s R/3.

Price Waterhouse now provides middleware that integrates SAP with Manugistics.

However, the concept of vendor-managed inventory is "highly controversial," said Thomas H. Freeman, editor of "Retail Systems Alert" in Newton, Mass. Replenishment strategies can be extremely sensitive, "and [some retailers] don't want the vendors to play a role," he said.

This type of system requires big cultural changes as well. "It's created new roles in the company," said Susan Olson, a replenishment analyst at Warner-Lambert.

Lastly, Nearnberg said, "The data has to be good. We're using information to run the business, and if it's not accurate and reliable, that's a big problem."

— Mary Brandel

PHOTOGRAPHY BY JOHN RAE

LONG MAY IT RULE

Client/server is becoming the rule rather than the exception in corporate America, according to 400 chief information officers surveyed by Deloitte & Touche this year. Use of client/server architectures rose almost 60% last year to 43% of all applications in use. CIOs expect that figure to increase another 35% this year.

IT TAKES ALL KINDS

IS professionals will need to work with interdisciplinary teams if their companies are to develop customer-focused applications residing on standalone PCs or the World Wide Web. These teams, said Forrester Research, Inc. in Cambridge, Mass., will comprise videographers, marketeers, content specialists, graphic artists and programmers.

QUICKER THAN THE HAND

Early users of intelligent agent technology receive time and cost savings in data gathering and management, according to a recent report by BIS Strategic Decisions in Norwell, Mass. In some cases, intelligent agent-enabled applications saved 80% in time and costs over manual/electronic methods.

on location

TO CATCH A MOUSE

Putting up an Internet firewall is like setting a mouse trap, one user recently theorized, except for one important difference: Do you want to catch the mouse or just confuse him? This particular health maintenance organization has decided on the latter course and plans to set up a multiprotocol, maze-like pathway. But it has to use a bit of psychology, too: A tricky pathway can provoke those hacker types.

GOOD THING THEY CHECKED

Perhaps you haven't noticed, but Sybase, Inc. has stripped the client/ server term from its slogan. Intensive market research preceded the change, including a survey that asked customers which company leapt to mind when they thought "client/server." The majority response? IBM. (P.S.: Sybase's slogan is now "The Architecture for Change.")

IT'S ELEMENTARY

Guess what kind of people often get hired as first-level help desk staffers? Former kindergarten teachers, according to Shaku Atre, president of Atre Associates, Inc., a Port Chester, N.Y., consultancy. The reason? Help desk personnel have to show the same level of enthusiasm each time they're asked the same question over and over again.

Taking the Road Less Traveled

Insurance giant uses rules-based expert system to select a distributed architecture

Imagine trying to get around an alien land without a road map. Now magnify that hopelessly lost feeling 100 times. Any resemblance to what it's like for the uninitiated to build a client/server architecture from scratch?

A few pioneers are choosing a not-so-obvious guide: They're tapping an expert system that was developed by Client/Server Connection Ltd. in Mount Kisco, N.Y. Running on a Windows-based PC or in a multiuser, multitasking client/server setup, CS/7000 consists of 14 modules including a methodology selector, which houses all the tasks needed to build a client/server system; a task manager; an architecture selector; a project planner; a resource manager; and a documentation generator.

You might wonder whether you can trust an expert system to select a client/server architecture or provide advice on, say, whether to take the distributed access or distributed database routes.

CNA Insurance Co. in Chicago thinks you can. The $1.6 billion firm's personal and casualty insurance line of business is using the rules-based expert system to craft a distributed architecture to replace its mainframe-based policy processing system.

CNA was starting from ground zero. "We could have hired a heavy-duty person for big dollars to draw pictures of different scenarios and still not [have] found out what to do," said Monty Mohanty, director of business technology at CNA. CS/7000 "gave us a good starting point to clear out the what-ifs and pin down a physical architecture."

CS/7000 prompted Mohanty's staff to think hard about key architectural requirements. Cost reduction, application flexibility, shortened time to market and use of new technologies were the primary objectives. From 64 options, CS/7000 recommended a distributed database server architecture tying together nine branches over a wide-area network.

Policyholder data germane to each location will be replicated from a central Oracle Corp. Oracle7 database server to branch-level servers and accessed by networked PCs. Any changes made locally will be updated daily on the master server.

Users should not expect the product to define a full architecture, though, said Richard Hunter, a Gartner Group, Inc. analyst in Stamford, Conn. "It is potentially of value by excluding wrong choices," Hunter said. "If, for example, you're driving from New York to Boston and someone tells you that it's a good thing to start out heading north, that's helpful, even if it doesn't get me to Route 95."

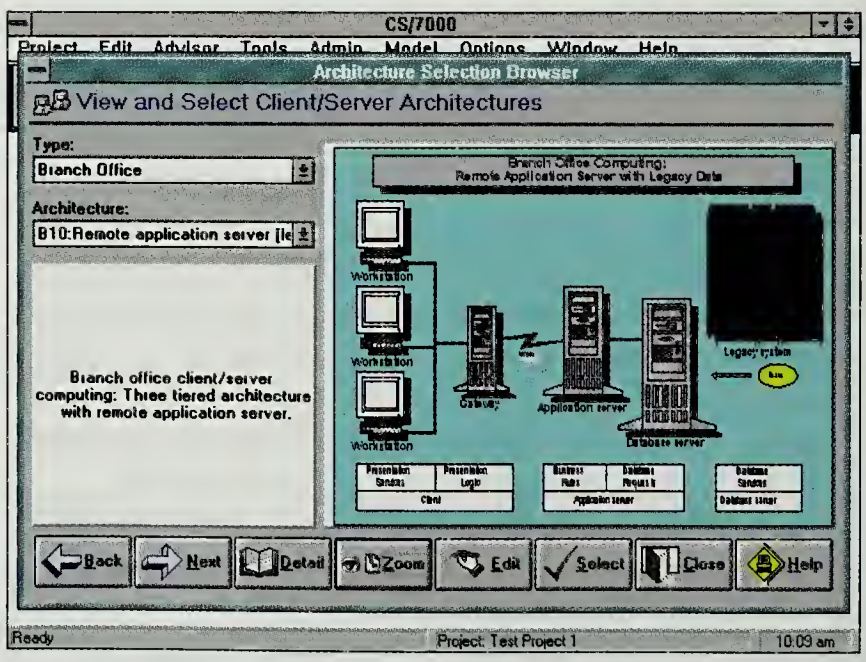
Mohanty agreed. "We had to refine [the architecture] to meet our requirements by adding on things like print architectures and a replication architecture."

CNA, which expects to finish its system rollout in early 1997, believes CS/7000 contributed a foundation that will account for "several hundred million dollars" in savings over multiple years, Mohanty estimated.

But users and analysts contend that the expert system should include on-the-fly learning. Version 2.0, slated for release by year's end, will offer a project estimator module that reconciles estimated and actual project hours.

CS/7000 costs $2,495 for a single license and $29,000 for an unlimited site license. ◩

—Alan Alper



Client/Server Connection's expert system pins down architectures

ILLUSTRATIONS BY LARRY GOODE

PROJECT PERISCOPE

A quick glance into client/server developments at user sites nationwide

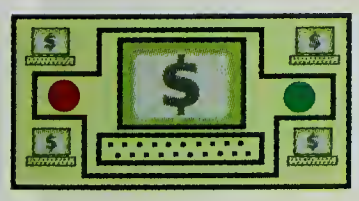
LONG CYCLES GET SHORT SHRIFT

Sprint Corp. knew something had to give. The long-distance provider's three IBM 3090, Cobol-based compensation systems were so complex, developers were spending up to five months a year hard-coding data into them. This meant sales representatives spent valuable time investigating their compensation status. So Kansas City, Mo.-based Sprint turned to Sapient Corp.

in Cambridge, Mass., to build a client/server-based sales compensation application that runs on a Unix-based, Oracle Corp. Oracle7 database server, accessed via a Windows-based front end. Now users of the rules-based, data-driven application, dubbed Intrepid, simply change data in tables, much like changing a cell in a spreadsheet. Updates to the plan that used to take Sprint five months now take only one day. And thanks to more up-to-date compensation data, each of 3,000 sales reps has gained back two to four hours a month of selling time.

CACHING OBJECTS

The derivatives and currency trading arena is complicated enough without having to make disparate technologies play nicely together. Canadian Imperial Bank of Commerce in New York is building an object-oriented, distributed applications architecture that will enable Windows desktops and Unix back-end trading systems to interoperate more effectively. The $116 billion (in assets) institution has built a homegrown OLE/CORBA bridge using Object Request Broker technology from Expersoft Corp. in San Diego. The bridge lets OLE 2.0 technology document-centric objects communicate with Common Object Request Broker Architecture (CORBA) network services. With the bridge, analysts in the bank's recently launched Financial Products Division will be able to access trading or pricing parameters data residing on a Sybase, Inc. relational database management system from a Microsoft Corp. Excel spreadsheet by invoking objects stored on a Sun Microsystems, Inc. SPARCserver. This allows the bank to replicate changing market position data across its network without mucking with persistent trading data that stays on Sybase, said Patrick Kerpan, the bank's managing director of financial products. Moreover, it lets Windows users more easily analyze trading data without moving to Unix workstations.



GOING FOR THE GOLD

Pharmacy Gold, Inc. in Eagan, Minn., recognizes the value of timely prescription claims data. The prescription drug benefits company used to churn out quarterly reports on key trends in drug therapy and recommended prescription/benefit changes three to four months after a quarter's close. Enter Gold Link, a decision-support application Pharmacy Gold developed with SAS Institute, Inc. Gold Link provides clients with more timely and direct access to data that can help them determine such things as how well their prescription benefits policy is working. Clients using Ocean Isle Software, Inc.'s ReachOut software on PCs dial in via modem to CommVision Corp. CommVision 1500 remote control servers. Once a user accesses the LAN-based application on one of the vacant servers, he builds parameters for his report by pointing and clicking his way through a series of graphical screens and icons. Gold Link can support up to eight simultaneous users. Pharmacy Gold, which began beta-testing the free service at client sites last month, expects it to give customers a competitive edge by providing direct access to updated reports about three months sooner.

ILLUSTRATIONS ABOVE LEFT BY TODD GRAVELINE;
ILLUSTRATIONS ABOVE RIGHT BY LARRY GOODE

on location

ALL THAT GLITTERS ISN'T GOLD

Sun is taking the Wild West nature of the Internet to the extreme. Sun's director of server marketing, Carl Stolle, recently compared the 'net to the gold rush of the 19th century. "Like Levi Strauss, who outfitted the gold rushers of the late 1800s, we want to be the outfitters for the Internet," he said.

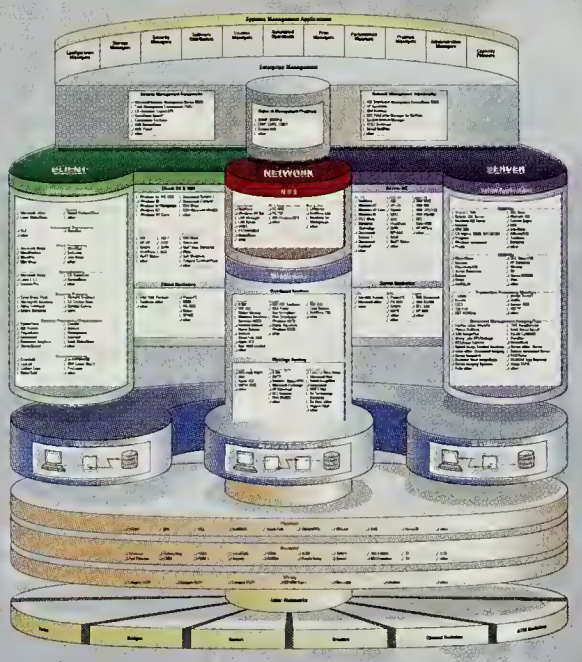
NO PERFECTIONISTS NEEDED

You probably already look for team spirit in potential client/server hires. But did you know you should also look for a strong sense of urgency and a willingness to forgo perfection? That's what Shaku Atre, president of Atre Associates, Inc., suggested, explaining you'll never reach perfection in client/server.

GETTING PISSY

Sun baked San Francisco's Moscone Center at the recent Sunworld Conference by unleashing a series of sexy Internet products such as dedicated servers, firewalls, World Wide Web authoring tools and multimedia home pages. But all that sizzled was not steak. Sun Chief Executive Officer Scott McNealy also introduced the company's new mascot, "Network" the dog, and provided four shiny fire hydrant facsimiles bearing the names IBM, Hewlett-Packard, Microsoft and Silicon Graphics for the canine to relieve himself on. Network declined.

The Client/Server Road Map was created by Jeff Tash, president of Database Decisions.



To navigate this landscape you'll need a good map.

Good thing we have one.

To order copies of the Road Map call:

800-381-7515

Database Decisions
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INSIGHTS

COMPUTERWORLD

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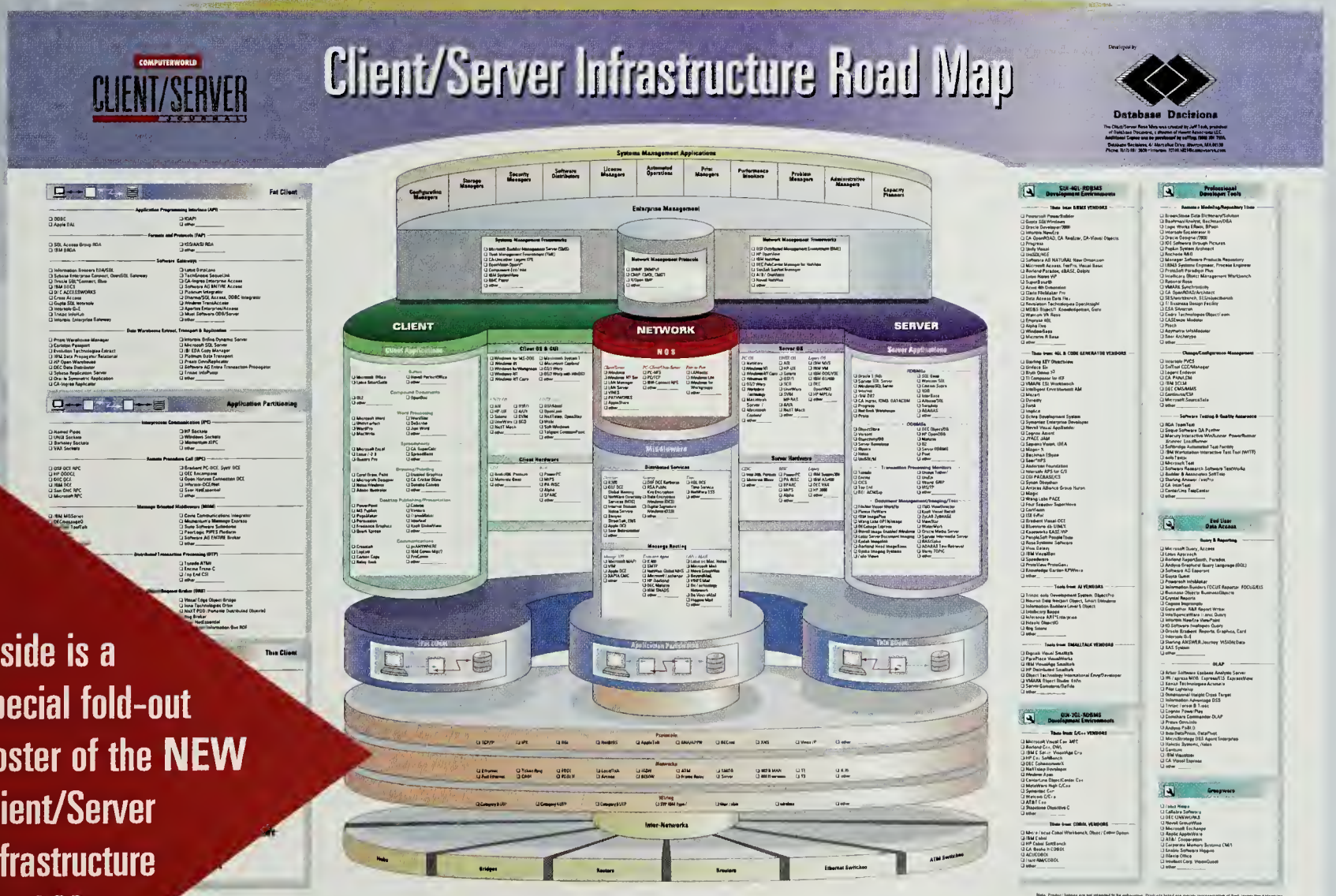
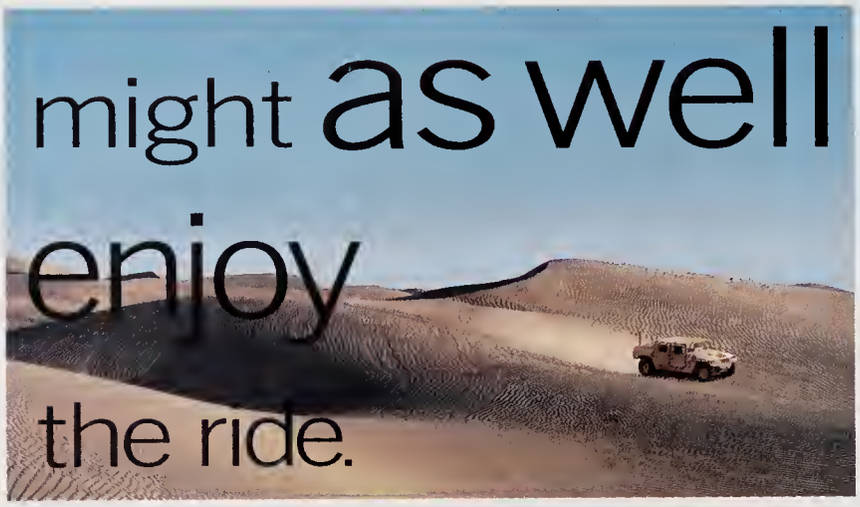
Special Fold-Out Poster



Inside is a special fold-out poster of the NEW Client/Server Infrastructure Road Map.

SCALABLE

Once you venture into client/server, there's no turning back. So you might as well enjoy the ride.



You know where you want to go with client/server. But do you know exactly how you're going to get there?

Plenty of companies can tell you.

Like the multi-billion dollar bank, handling up to 120,000 calls a day, that completely reconfigured its customer service operations.

The giant retailing conglomerate that totally reengineered its customer database infrastructure for 500 stores.

And the developer of information systems that integrated a central government's wage and tax system into its accounting and purchasing systems.

All had ambitious business plans, a large number of end users, and a critical need to support rapidly-changing business processes.

All selected Seer*HPS to develop client/server computing solutions across their enterprise.

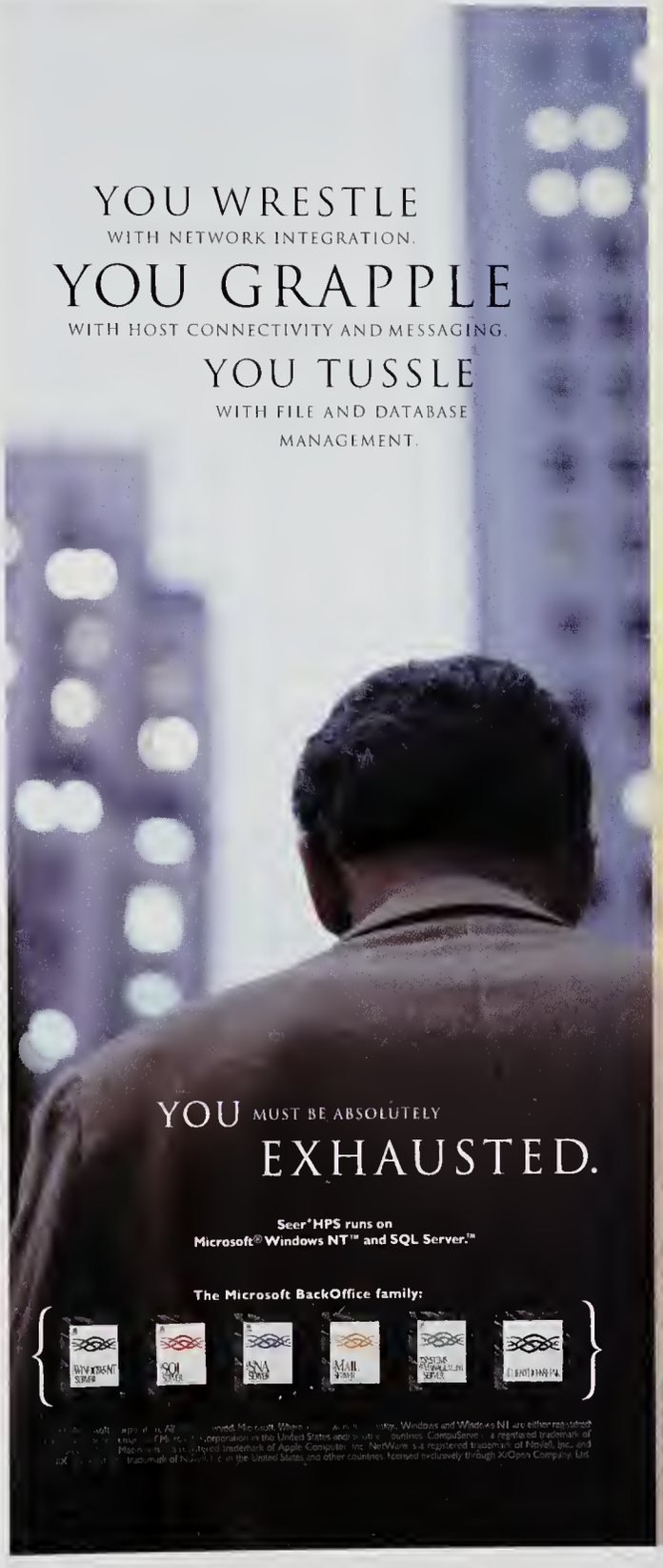
And all found their journey into client/server to be challenging yet still extremely rewarding.

Mainly because they had the ideal traveling companion. Seer.

SEER®
We've been there.

Across a department, across the enterprise,

APPLICATIONS



Take heart. There's a new, integrated family of server software called Microsoft BackOffice. And it will empower you to do your job. With authority.

Introducing Microsoft BackOffice, five best-of-breed products that combine to form an integrated information system. One complete, seamless client-server network based on Windows NT™ architecture that will enable you to create the next generation of information applications.

Start with the network operating system-Windows NT Server. After that, it's easy to add a database (Microsoft SQL Server™), messaging (Microsoft Mail Server), host connectivity (Microsoft SNA Server), and systems management (Microsoft Systems Management Server). It's easy to get things up and running, too. Everything is optimized to work with Windows NT Server, and everything is designed to work together.

Forget struggling with assorted tools and incompatible interfaces. With Windows® architecture on both the client *and* the server, you'll use a consistent, graphical set of tools to develop and manage applications across all products.

Now about money. And choice. Microsoft BackOffice is an open platform designed to extend your existing network, *including* Netware,® Macintosh,® and Unix.® It runs on standard, leading hardware, which lowers the cost of purchase and operation. And there are over one thousand 32-bit Windows NT applications and tens of thousands of 16-bit Windows applications at your disposal.

Call (800) 709-3783 to learn more. Or contact us at "GO BIZSOLN" on CompuServe.® You can revolutionize the way people in your company use and share information. And make your world more agreeable in the process.

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Whether you need to scale up or down, handle large database or transactional systems or reengineer to new open systems, we'll show you the way. And we'll guide you to secure solutions for high-transaction throughput in large-scale enterprise systems.

Thousands of companies depend on Microsoft to run their businesses. Did you ever wonder who Microsoft depends on to run theirs?

As one of the largest developers of software in the world, with hundreds of thousands of customers around the globe, there's just one thing about Microsoft that people sometimes overlook: That they've got a business to run, too.

A business with people who need constant (and instant) access to crucial information–like customer service records and problem/solution databases. And a Microsoft® Windows NT™ Server network that not only serves their headquarters near Seattle but all of their offices around the world. So they need to have server systems they can count on.

Which is why they rely on Compaq.

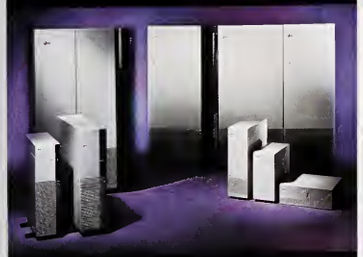
Because Compaq provides reliable servers that keep running. Servers that allow you to configure Microsoft Windows NT Server simply and easily with one CD. And Compaq has servers that come with Insight Manager, which is a specially designed Compaq technology that manages over 800 key server elements and warns you about potential problems. Before they become real ones.

And because they're Compaq servers, each one is backed by our three-year on-site warranty* and our 7 day a week, 24-hour technical support line.

So if you're looking for a powerful and reliable system to help you run your business, give us a call at 1-800-664-9888. But do yourself a favor, don't just take our word for it. Ask around.

COMPAQ

You've Got the Road Map...



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Together, we'll show you the clear path to scalable distributed computing, no matter what the size, shape or complexity of your current systems.

COMPUTERWORLD
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Client/Server Infrastructure Road Map

Developed by

Database Decisions

The Client/Server Road Map was created by Jeff Tash, president of Database Decisions, a division of Hewitt Associates LLC.
Additional Copies can be purchased by calling (800) 381-7515
Database Decisions, 41 Marcellus Drive, Newton, MA 02159
Phone: (617) 891-3600 • Internet: 70740.1021@compuserve.com

Fat Client

Application Programming Interface (API)

- ❑ ODBC
- ❑ Apple DAL
- ❑ IDAPI
- ❑ other_____

Formats and Protocols (FAP)

- ❑ SQL Access Group RDA
- ❑ IBM DRDA
- ❑ ISO/ANSI RDA
- ❑ other_____

Database Gateways

- ❑ Information Builders EDA/SQL
- ❑ Sybase Enterprise Connect, OmniSQL Gateway
- ❑ Oracle SQL*Connect, Glue
- ❑ IBM DDCS
- ❑ DEC ACCESSWORKS
- ❑ Cross Access
- ❑ Gupta SQL Network
- ❑ Intersolv Q+E
- ❑ Trinzic InfoHub
- ❑ Informix-Enterprise Gateway
- ❑ Lotus DataLens
- ❑ TechGnosis SequeLink
- ❑ CA-Ingres Enterprise Access
- ❑ Software AG ENTIRE Access
- ❑ Platinum Integrator
- ❑ Dharma/SQL Access, ODBC Integrator
- ❑ Netwise TransAccess
- ❑ Apertus Enterprise/Access
- ❑ Must Software DDB/Server
- ❑ other_____

Data Warehouse Extract, Transport & Replication

- ❑ Prism Warehouse Manager
- ❑ Carleton Passport
- ❑ Evolution Technologies Extract
- ❑ IBM Data Propagator Relational
- ❑ HP Open Warehouse
- ❑ DEC Data Distributor
- ❑ Sybase Replication Server
- ❑ Oracle Symmetric Replication
- ❑ CA-Ingres Replicator
- ❑ Informix Online Dynamic Server
- ❑ Microsoft SQL Server
- ❑ IBI EDA Copy Manager
- ❑ Platinum Data Transport
- ❑ Praxis OmniReplicator
- ❑ Software AG Entire Transaction Propogator
- ❑ Trinzic InfoPump
- ❑ other_____

Application Partitioning

Interprocess Communication (IPC)

- ❑ Named Pipes
- ❑ UNIX Sockets
- ❑ Berkeley Sockets
- ❑ VAX Sockets
- ❑ HP Sockets
- ❑ Windows Sockets
- ❑ Momentum XIPC
- ❑ other_____

Remote Procedure Call (RPC)

- ❑ DSF DCE RPC
- ❑ HP DODCE
- ❑ DEC DCE
- ❑ IBM DCE
- ❑ Sun DNC RPC
- ❑ Microsoft RPC
- ❑ Gradient PC-DCE, SysV-DCE
- ❑ DEC Encompass
- ❑ Open Horizon Connection DCE
- ❑ Informix-DCE/Net
- ❑ Seer NetEssential
- ❑ other_____

Message Oriented Middleware (MOM)

- ❑ IBM MQSeries
- ❑ DECmessageQ
- ❑ SunSoft ToolTalk
- ❑ Novell/Q
- ❑ AT&T RTQ
- ❑ Seer NetEssential
- ❑ Covia Communications Integrator
- ❑ Momentum's Message Express
- ❑ Suite Software Suitedome
- ❑ PeerLogic PIPES Platform
- ❑ Software AG ENTIRE Broker
- ❑ other_____

Distributed Transaction Processing (DTP)

- ❑ X-ATMI
- ❑ TxRPC
- ❑ CPI-C
- ❑ CICS API
- ❑ Tuxedo ATMI
- ❑ Encina Trans-C
- ❑ Top End CSI
- ❑ other_____

Object Request Broker (ORB)

- ❑ OMG CORBA, CORBA 2
- ❑ IBM SOM/DSOM
- ❑ HP ORB Plus
- ❑ DEC Object Broker
- ❑ SunSoft DOE
- ❑ Microsoft COM, OLE2
- ❑ Novell AppWare
- ❑ Visual Edge Object Bridge
- ❑ Iona Technologies Orbix
- ❑ NeXT PDO (Portable Distributed Objects)
- ❑ Ilog Broker
- ❑ Seer NetEssential
- ❑ Teknekron Information Bus ROF
- ❑ other_____

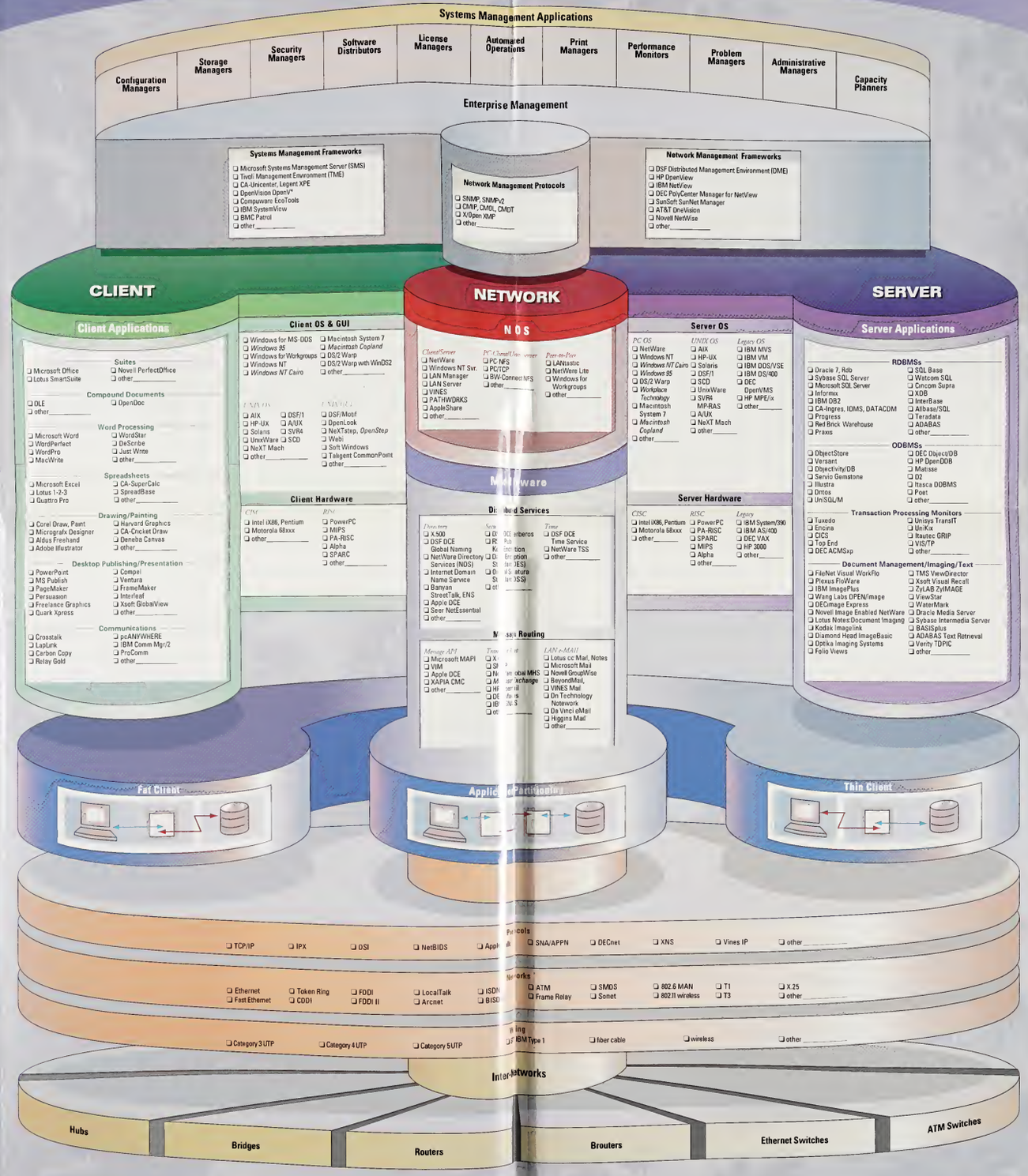
Thin Client

Legacy Screen Scrapers

- ❑ Attachmate Extra! Tools, Quickapp
- ❑ Wall Data RUMBA Tools
- ❑ Ericon Technology Access
- ❑ Sterling VISION:Flashpoint
- ❑ Mozart
- ❑ VMARK ESL Workbench
- ❑ IBM Personal Communications Tools
- ❑ NetSoft EHLLAPI Toolkit
- ❑ mcr-Productivity Services C/S
- ❑ ICOT OmniPATH
- ❑ other_____

X-Windows Code Generators

- ❑ Neuron Data Open Interface
- ❑ XVT Portability Toolkit, Power++
- ❑ Bluestone UIM/X
- ❑ Liant C++/Views
- ❑ Zinc Designer
- ❑ ICS Builder Xcessory
- ❑ Ateya TeleUSE
- ❑ Open Aspect
- ❑ NSL XFaceMaker
- ❑ HP Interface Architect
- ❑ IBM AIXwindows Interface Composer
- ❑ DEC Visual User Interface Tool
- ❑ V.I. Corp. X-Designer
- ❑ KASE:C++
- ❑ ParcPlace Object Builder
- ❑ other_____



GUI-4GL-RDBMS Development Environments

Tools from: OBMS VENDORS

- ❑ Powersoft PowerBuilder
- ❑ Gupta SQLWindows
- ❑ Oracle Developer/2000
- ❑ Informix NewEra
- ❑ CA-OpenRDAD, CA-Realizer, CA-Visual Objects
- ❑ Progress
- ❑ Unify Vision
- ❑ UniSQL/4GE
- ❑ Software AG NATURAL New Dimension
- ❑ Microsoft Access, FoxPro, Visual Basic
- ❑ Borland Paradox, dBASE, Delphi
- ❑ Lotus Notes ViP
- ❑ SuperBase95
- ❑ Actius 4th Dimension
- ❑ Claris FileMaker Pro
- ❑ Data Access Data Flex
- ❑ Revelation Technologies OpenInsight
- ❑ MDBS Object/1, Knowledgeman, Guru
- ❑ Watcom VX-Rexx
- ❑ Empress 4GL
- ❑ Alpha Five
- ❑ WindowBase
- ❑ Microrim R:Base
- ❑ other_____

Tools from: 4GL & CODE GENERATOR VENDORS

- ❑ Sterling KEY:Objectview
- ❑ Uniface Six
- ❑ Blyth Dmnq ³
- ❑ TI Composer for IEF
- ❑ VMARK ESL Workbench
- ❑ Intelligent Environments AM
- ❑ Mozart
- ❑ Dynasty
- ❑ Forté
- ❑ Implicit
- ❑ Dchre Development System
- ❑ Symantec Enterprise Developer
- ❑ Novell Visual AppBuilder
- ❑ Cognos Axiant
- ❑ JYACC JAM
- ❑ Sapiens Vision, IDEA
- ❑ Magna X
- ❑ Bachman Ellipse
- ❑ Seer*HPS
- ❑ Andersen Foundation
- ❑ Intersolv APS for C/S
- ❑ CGI PACBASE/CS
- ❑ Synon Dbsydian
- ❑ Antares Alliance Group Huron
- ❑ Magic
- ❑ Wang Labs PACE
- ❑ Four Seasons SuperNova
- ❑ CorVision
- ❑ ISE Eiffel
- ❑ Gradient Visual-DCE
- ❑ Bluestone db-UIM/X
- ❑ Kaseworks KASE:V/P
- ❑ PeopleSoft PeopleTools
- ❑ Ross Systems Gembase
- ❑ Visix Galaxy
- ❑ IBM VisualGen
- ❑ Speedware
- ❑ ProtoView ProtoGen+
- ❑ Knowledge Garden KPWin++
- ❑ other_____

Tools from: AI VENDORS

- ❑ Trinzic Aion Development System, ObjectPro
- ❑ Neuron Data Nexpert Object, Smart Elements
- ❑ Information Builders Level 5 Object
- ❑ Intellicorp Kappa
- ❑ Inference ART*Enterprise
- ❑ Hitachi DiscriTQ
- ❑ Ilog Solver
- ❑ other_____

Tools from: SMALLTALK VENDORS

- ❑ Digitalk Visual Smalltalk
- ❑ ParcPlace VisualWorks
- ❑ IBM VisualAge Smalltalk
- ❑ HP Distributed Smalltalk
- ❑ Object Technology International Envy/Developer
- ❑ VMARK Object Studio, Enfin
- ❑ Servio Gemstone/GeOde
- ❑ other_____

GUI-3GL-RDBMS Development Environments

Tools from: C/C++ VENDORS

- ❑ Microsoft Visual C++, MFC
- ❑ Borland C++, DWL
- ❑ IBM C Set++, VisualAge C++
- ❑ HP C++ SoftBench
- ❑ DEC CohesionwoX
- ❑ NeXTstep Developer
- ❑ Rational Apex
- ❑ CenterLine ObjectCenter C++
- ❑ MetaWare High C/C++
- ❑ Symantec C++
- ❑ Watcom C/C++
- ❑ AT&T C++
- ❑ Stepstone Objective C
- ❑ other_____

Tools from: COBOL VENDORS

- ❑ Micro Focus Cobol Workbench, Object Cobol Option
- ❑ IBM Cobol
- ❑ HP Cobol SoftBench
- ❑ CA-Realia II COBOL
- ❑ ACUCOBOL
- ❑ Liant RM/COBOL
- ❑ other_____

Professional Developer Tools

Business Modeling/Repository Tools

- ❑ BrownStone Data Dictionary/Solution
- ❑ Bachman/Analyst, Bachman/DBA
- ❑ Logic Works ERwin, BPwin
- ❑ Intersolv Excelerator II
- ❑ Oracle Designer/2000
- ❑ Progress
- ❑ Popkin System Architect
- ❑ Rochade R&D
- ❑ Manager Software Products Repository
- ❑ LBMS Systems Engineer, Process Engineer
- ❑ ProtoSoft Paradigm Plus
- ❑ Intellicorp Object Management Workbench
- ❑ Rational Rose
- ❑ VMARK Synchronicity
- ❑ CA-OpenRDAD/Architect
- ❑ SES/workbench, SES/objectbench
- ❑ TI Business Design Facility
- ❑ CSA Silvernan
- ❑ Watcom VX-Rexx
- ❑ Cadre Technologies ObjectTeam
- ❑ CASEwise Modeler
- ❑ Ptech
- ❑ Asymetrix InfoModeler
- ❑ Seer Archetype
- ❑ other_____

Change/Configuration Management

- ❑ Intersolv PVCS
- ❑ SofTool CCC/Manager
- ❑ Legent Endevor
- ❑ CA-PAN/LCM
- ❑ IBM SCLM
- ❑ DEC CMS/MMS
- ❑ Continuus/CM
- ❑ Microsoft SourceSafe
- ❑ other_____

Software Testing & Quality Assurance

- ❑ SQA TeamTest
- ❑ Seque Software QA Partner
- ❑ Mecury Interactive WinRunner, PowerRunner, Xrunner, LoadRunner
- ❑ Softbridge Automated Test Facility
- ❑ IBM Workstation Interactive Test Tool (WITT)
- ❑ AutoTester
- ❑ Microsoft Test
- ❑ Software Research Software TestWorks
- ❑ Bender & Associates SoftTest
- ❑ Sterling Answer:TestPro
- ❑ CA-InterTest
- ❑ CenterLine TestCenter
- ❑ other_____

End User Data Access

Query & Reporting

- ❑ Microsoft Query, Access
- ❑ Lotus Approach
- ❑ Borland ReportSmith, Paradox
- ❑ Andyne Graphical Query Language (GQL)
- ❑ Software AG Esperant
- ❑ Gupta Quest
- ❑ Powersoft InfoMaker
- ❑ Information Builders FOCUS Reporter, FDCUS/EIS
- ❑ Business Objects BusinessObjects
- ❑ Crystal Reports
- ❑ Cognos Impromptu
- ❑ Concentric R&R Report Writer
- ❑ IntelligenceWare Iconic Query
- ❑ Informix NewEra ViewPoint
- ❑ IQ Software Intelligent Query
- ❑ Oracle Browser, Reports, Graphics, Card
- ❑ Intersolv Q+E
- ❑ Sterling ANSWER:Journey, VISION:Data
- ❑ SAS System
- ❑ other_____

OLAP

- ❑ Arbor Software Essbase Analysis Server
- ❑ IRI Express MDB, Express/EIS, ExpressView
- ❑ Kenan Technologies Acumate
- ❑ Pilot Lightship
- ❑ Oimensional Insight Cross Target
- ❑ Information Advantage DSS
- ❑ Trinzic Forest & Trees
- ❑ Cognos PowerPlay
- ❑ Comshare Commander DLAP
- ❑ Praxis OmniInfo
- ❑ Andyne PaBLD
- ❑ Brio DataPrism, DataPivot
- ❑ MicroStrategy DSS Agent Enterprise
- ❑ Holistic Systems, Holos
- ❑ Gentium
- ❑ IBM Visualizer
- ❑ CA-Visual Express
- ❑ other_____

Groupware

- ❑ Lotus Notes
- ❑ Collabra Software
- ❑ DEC LINKWDRKS
- ❑ Novell GroupWise
- ❑ Microsoft Exchange
- ❑ Applix ApplixWare
- ❑ AT&T Cooperation
- ❑ Corporate Memory Systems CM/1
- ❑ Enable Software Higgins
- ❑ Oracle Office
- ❑ Intellect Corp. VisionQuest
- ❑ other_____

Note: Product listings are not intended to be exhaustive. Products listed are merely representative of their respective categories.

Five on Win '95

MULTIPROTOCOL NETWORKING SUPPORT, MULTITASKING, PLUG AND PLAY, 32-BIT CAPABILITIES, LONG FILE NAMES AND A MAC-LIKE DRAG-AND-DROP INTERFACE HAVE A PRICE

So you want to be the first on your block with a Windows 95 client/server front end? Well, getting there from here will be more timely, costly and gut-wrenching than you may have originally thought. Migration will cost $200 to $700 per user in hardware acquisition and installation, training and technical support costs, according to Gartner Group, Inc. in Stamford, Conn. Then there's the question of forsaking Windows 95 for Windows NT, as its true 32-bit environment gets you one step closer to object-oriented Cairo.

In the end, a well-thought-out migration plan will work best, according to five technologists who have spent time considering all the options. Here's their advice.

1 APPLICATIONS: The decision of when to migrate applications built with third-party tools such as Powersoft Corp.'s PowerBuilder depends on when those vendors fully support Windows 95, said Jeff Greenberg, MIS manager at CNBC in Fort Lee, N.J.

His company's applications that are built with lower-level languages or that use DOS to access mainframe data will have to be rewritten, he added.

The Win32s application programming interface isn't totally consistent between NT and Windows 95, even though there's a lot of overlap, said George Roukas, vice president of business development at The Windows Support Group in New York. "If you want to create portable code, it's another case of making sure the functions you're calling are in both implementations," he said.

2 RESOURCE MANAGEMENT: Windows 95 will make life easier for systems administrators in two ways: reaching 600K bytes via extended memory and built-in Novell, Inc. NetWare connectivity; and setting information systems policies in areas such as screen resolution and access to file and print sharing.

"In Windows for Workgroups, you couldn't stop [users] from doing that," said Howard Marks, chief scientist at TigerTeam, Inc., a Norwalk, Conn., consultancy. The downside: "Setup takes 45 minutes per workstation," he said.

3 DESKTOP PERMUTATIONS: "Windows 95 will be one of several desktops we'll have," said Michael Heller, director of technology services at The Journal of Commerce in Phillipsburg, N.J. "The issue is what number of people and what profile do we want each user to have and what resources need to be shared between Windows 3.1, Windows 95, Windows for Workgroups and NT."

4 HARDWARE: Besides upgrading to a 486, 33-MHz, 8M- or 12M-byte machine with a 340M-byte disk, you should be on the lookout for hardware incompatibilities with uncommon systems, peripheral devices and software drivers.

"We have found in testing clone boxes [with the April beta] that they have video driver problems, even if they're using a straight vanilla card," said Hank Coleman, president of Twenty20 Visual Systems Corp. in Dallas, a developer of turnkey systems for the hospitality and restaurant industry. "Dell, Compaq, CompuAdd, IBM, AST were fine; Gateway was a problem."

5 TRAINING: "I question Microsoft's assertion that after 20 minutes on 95, anyone can become proficient," said Arthur Tisi, CIO at the Metropolitan Museum of Art in New York. "We found it much easier to go from DOS to any GUI than from File Manager/Program Manager [in Windows 3.1] to Explorer and other things in 95. If you're using a Macintosh and going to Windows 95, it's a slam dunk." ◩

Confused? Microsoft is offering The Windows 95 Migration Planning Kit on CD-ROM or hard copy. To order, access Microsoft's home page at http://www.microsoft.com/ or call (800) 677-7377.

BUZZWORDS

A compendium of recently generated buzzwords:

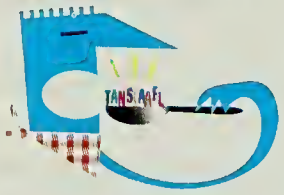
***ATOMIC DATA: Data elements that represent the lowest level of detail.**

***MINI MART: A subset of a data warehouse used by a small number of users.**

DATA SCRUBBING: The process of filtering, merging, decoding and translating source data to validate it for the data warehouse.

MUDDLEWARE: A disparaging term for the products that enable disparate systems to interoperate. Includes SQL gateways, ODBC, RPCs, NFS connectivity software or message-oriented middleware.

***MIP-O-SUCTION: A query that consumes a high percentage of CPU cycles.**



***TANSTAAFL: "There ain't no such thing as a free lunch" when it comes to data warehousing.**

**Compliments of the Datawarehousing Glossary published by Meta Group, Inc. and Software AG.*

ILLUSTRATIONS BY TODD GRAVELINE

When Three Tiers Are Better Than Two

Three-tier architectures can support more users, platforms and data

BY CAROL REALINI

So much is said about two-tier vs. three-tier client/server architectures, and yet so little is understood. Two-tier has certainly been around longer. Early client/server applications — decision-support systems for small workgroups — were almost always two-tier, and for good reason. Two-tier offers cross-platform portability and rapid development of solutions.

But because the two-tier model splits an application into front ends (clients) and back ends (servers) and supports a limited number of clients, it may not be able to effectively handle complex applications distributed across an enterprise. Also, as businesses change, the business processes will need to be updated as well. Such changes are not so easily incorporated in two-tier.

That's where three-tier comes in. As client/server applications move to the enterprise, the number of connections and platforms that can be supported must be extended and modified. When developers need to express complex business logic or roll out a large program to many users, it is not feasible for the business logic to be linked with the graphical user interface or database server. Instead, the logic must be capable of being separated and modified.

That's what three-tier applications do. The presentation layer or user interface is in the client, the database is on the server, and the business logic is on a third platform.

So when do you use three-tier architectures vs. two-tier? The following criteria can help you decide:

- If the number of concurrent database connections or sessions is greater than 50, you will most likely need to use three-tier.
- If your application calls for shared business logic and you are considering extensive use of stored procedures, take a serious look at three-tier.
- Extensive use of caching is difficult to implement and manage at the client level (two-tier) and easier with application servers (three-tier).
- If your application needs to authenticate individual users and their access to the database, three-tier will reduce the associated management and overhead.
- Multiple physical sites connected with wide-area networks will most likely require a three-tier architecture.

For all its functionality, a three-tier architecture poses many challenges as well. The most difficult is tool selection. These tools are new to the market, so while some are emerging as best of breed de are gaining credibility in re enterprise production env ronments, there is also tre mendous hype from tools a application vendors claimi three-tier capabilities.

The next challenge is p ning the infrastructure, ap cation design and system d ployment. Because enterp e client/server is so new, it is extremely difficult to find sta members with the experie to do this. Mistakes in plan ning can escalate project costs, create rework and schedule slips and caus lost business opportun ties from longer imple- mentation times.

If you don't think yo have the skills, you sho consider bringing in an pert team. You can use h ing and mentoring to buil in-house skills over time.

But although the challenges are great, the bene of three-tier are equally great. It supports a large number of users, dispa rate platforms, greater volumes of data, more transactions and sign cantly more complex business applications.

The three-tier model giv users greater flexibility and more options for scaling an partitioning their applications. This, in turn, gives co panies the ability to rapidly create and modify complex enterprisewide client/serv applications with cost-comp itive advantages. ◩

Realini is president and chie executive officer at J. Frank Consulting in Palo Alto, Ca You can reach her via E-mai at carol.reali @jfrank.com.

ILLUSTRATION BY JAMIE HO N

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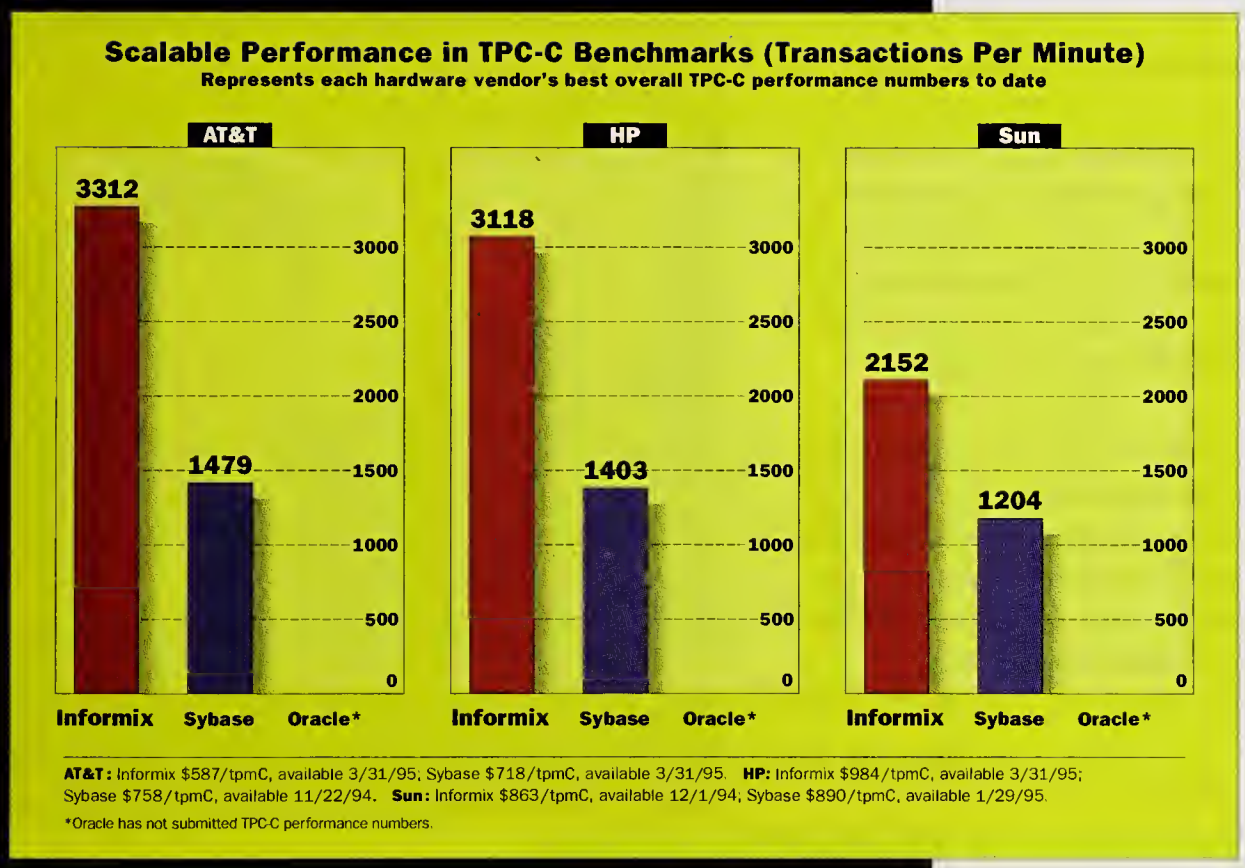

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NAME: Ki Wilson, senior microcomputer analyst

COMPANY: Stone Container Corp., a $5.8 billion paper manufacturing company in Chicago

SIZE: Over 3,000 PCs in the U.S. and over 500 nodes at headquarters

ENVIRONMENT: 95% NetWare and 5% stand-alone PCs

STANCE: "There's no way we'll abandon NetWare. But Novell desperately needs a compelling application strategy, and they need to deliver SuperNOS as quickly as possible in order not to lose momentum."

NAME: Dean Johnson, information delivery manager

COMPANY: Freudenberg-NOK General Partnership, a $500 million auto parts manufacturer in Bristol, N.H.

SIZE: About 1,500 users at 15 facilities worldwide

ENVIRONMENT: 100% NetWare 3.12 shop

STANCE: "We were so discouraged by the problems with NetWare 4.0 two years ago that we even began to question our continued commitment to Novell. Now, it's an entirely different story. Ultimately, Novell will own the market if it can solve its problems with its NetWare Loadable Modules and technical support issues."

NAME: Steve Sommer, director of MIS

COMPANY: Hughes Hubbard & Reed, a New York law firm

SIZE: Some 600 users in five sites, including New York, Paris, Berlin, Miami, Los Angeles and Washington

ENVIRONMENT: NetWare 3.12

STANCE: "I'm tossing NetWare out the door and hope to have the transition to NT completed within a year. Novell says it's geared for the enterprise, but I don't believe it. It's spread too thin, and the lack of focus will be their downfall."

Which Way, Novell?

THE BIG LAN-CHILADA LOOKS TO TRANSCEND ITS FILE AND PRINT SERVICES IMAGE AND SECURE A NODE IN THE MULTIVENDOR-HEAVY, MICROSOFT-INFLUENCED, CLIENT/SERVER COMPUTING WORLD

The war is Novell's to win or lose.

The company whose NetWare network operating system became the undisputed champion of LAN file and print services in the 1980s now faces its fiercest battle to date: recasting itself as a top supplier of distributed computing platforms for enterprise networks.

Provo, Utah-based Novell, Inc. has more than enough ammunition:

- A 70% share of the LAN market, which translates into an installed base of some 40 million strong.
- Widespread support among independent software vendors.
- Thousands of Certified NetWare Engineers.
- Growing sales of NetWare 4.1 and Groupwise groupware platforms. Currently, NetWare 4.1 accounts for 35% of all new business, according to Jamie Lewis, president of the Burton Group, a consultancy in Salt Lake City. And Groupwise has increased market share from 9% to 16%.

Those factors alone make it difficult for rivals to shoot down Novell. "NetWare is entrenched in the network fabric," said Dave Capuccio, vice president and research director of network technologies at Gartner Group, Inc., a consultancy in Stamford, Conn.

But there are obvious chinks in Novell's armor. First, it has self-inflicted wounds: acute acquisition indigestion (20 acquisitions completed in the past few years); an inability to position NetWare as an applications server; and bumbled attempts to successfully deliver an object-oriented, cross-platform application development environment dubbed AppWare (see story page 26).

Twisting the knife is archrival Microsoft Corp., which (after some fits and starts) is beginning to hurt Novell with Windows NT Server 3.51. An increasing number of companies are piloting or deploying NT Server 3.51 as an application server in a variety of workgroup and departmental computing settings. Roughly 90% of all NetWare sites are considering installing or actually deploying Windows NT servers to complement NetWare or displace the network operating system, Capuccio said.

The reason? Though lacking NetWare 4.x's exquisite global directory services, NT Server is packaged with BackOffice, a powerful combination of modules handling systems management, a database, mainframe connectivity and electronic mail/groupware.

For the most extreme NT Server adopters, BackOffice's functionality is as critical to the server side of distributed computing as Microsoft's Office is to the client side [CSJ, April 1995]. To these companies, building NetWare applications with inefficient and expensive NetWare Loadable Modules is history.

"Long term, the big battle won't be NetWare 4.1 vs. Windows NT Server. It's Novell's application strategy vs. Microsoft's front- and back-office suites," Lewis predicted.

Such a prognostication is causing users such as Jim Lisiak to hedge their bets. Lisiak is an MIS manager at

Please turn to page 24

BY LAURA DIDIO

PHOTOGRAPHY FROM TOP: JAMES SCHEPF; JACK FOLEY; SHONNA VALESKA

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EXTENDING YOUR REACH™

TEXAS INSTRUMENTS

STONE CONTAINER will continue to use NetWare as a strategic platform for file, print and directory services. But Windows NT Server has gained a foothold as an applications server and a platform for custom application development. On the desktop, Stone "just dumped" Novell's WordPerfect Office Suite for Word for Windows, which had better performance, said Ki Wilson, senior microcomputer analyst.

FREUDENBERG-NOK is considering an upgrade to NetWare 4.1. But it is also looking at adding Windows NT Server as an adjunct application server for data warehousing applications. The firm will likely migrate to Novell's Groupwise, according to Dean Johnson, information delivery manager at Freudenberg-NOK, because it believes Groupwise is more cost-effective and easier to manage than Notes.

HUGHES HUBBARD will replace NetWare within the year with Windows NT Server 3.51. The law firm's main thrust is to handle large applications and databases, and NT Server fits the bill, particularly its SMP capabilities. NT will provide 30% to 50% better throughput over NetWare, whose performance "grinds to a screaming halt when you add applications," said Steve Sommer, director of MIS.

Continued from page 21

Chevron Information Technology Co., a San Ramon, Calif., division of Chevron USA, Inc. with 20,000 users.

"Right now, we're 90% NetWare and 10% Windows NT server. Over the next three years, we expect it will be a 60/40 split, albeit still in NetWare's favor," Lisiak said. "Who wins the war of the back-office applications will determine who wins the server wars . . . and Microsoft is just so dominant in the area of applications."

Driving Chevron's NT Server decision is its desire to solidify its back-end databases. "It's simple," Lisiak said. "NT Server can now accommodate large applications. And applications are the weakest link in NetWare's strategy."

PEACE IN OUR TIME

Ki Wilson, senior microcomputer analyst at Stone Container Corp., a paper manufacturing company in Chicago, is similarly committed to NetWare as an enterprise network operating system platform. Wilson said he foresees peaceful coexistence between the two.

Stone Container will install NT Server at its remote manufacturing facilities, combining BackOffice's remote communications, SNA and Microsoft's Systems Management Server functionalities into a single server. That type of functionality is currently hard to achieve with NetWare, said Dan Schuffert, a senior systems programmer and Wilson's colleague.

"NetWare requires separate server platforms to make each function run acceptably in a real-time network environment," Schuffert said. Businesses can load various types of servers on top of NetWare, "but if you attached 500 users to a single server with all of those components loaded, the NetWare file server would take too big a performance hit," he said.

Still, Wilson said, NetWare 4.1 with NetWare Directory Services "outperforms NT Server across the enterprise and is still the more stable product."

Freudenberg-NOK General Partnership, an auto parts manufacturer in Bristol, N.H., has also achieved harmony among its contingent of 1,500 NetWare users and the new crop of NT Server 3.51 users.

Freudenberg-NOK is deploying Windows NT Server as an application server for its three data warehouses. That is, NT Server and SQL Server 6.0 will launch and control applications that perform on-line queries. Users will be able to manipulate data on specific auto parts, including the purchasing history for line items, and detail how much the company paid for specific parts and when they were purchased in order to write consolidated reports.

"NetWare is there for file and print services on the desktop, Unix is there for manufacturing, and we'll deploy NT Server for all our application-specific information queries," said Dean Johnson, information delivery manager at the company.

A LESS ROSY PICTURE

But for almost every dozen tales of harmonic convergence, there's a war story of NT encroachment.

Cheaper application and database costs, for instance, drove Jesse Rodriguez, director of information technologies at the Unified School District in Tucson, Ariz., reluctantly into NT Server's waiting arms.

"NetWare's Sybase NLM, for instance, is outrageously expensive. It would have cost us over $20,000 per server based on configuration and number of concurrent connections throughout our school district," Rodriguez related. By contrast, he said, the Windows NT SQL Server application, "priced at less than $2,000, was an order of magnitude cheaper. I was able to purchase SQL Server and NT Server 3.5 and Microsoft Mail for all 109 school sites at a cheaper price than the NetWare site license alone for 64 sites."

NOVELL FACES REAL CHALLENGES IN TRANSFORMING PERVASIVE COMPUTING INTO A CLIENT/SERVER STRATEGY THAT JIBES WITH ITS PRODUCT ROSTER AND POSITIONS IT FOR THE NEXT DECADE.

And for Steve Sommer, director of MIS at Hughes Hubbard & Reed, a law firm in New York, the war has ended, and Microsoft's NT Server is the clear-cut winner: "I'm tossing NetWare out the door and hope to have the transition to NT completed within a year."

Sommer wants to take advantage of NT Server's symmetrical multiprocessing (SMP) and multithreaded capabilities, which give "us 30% to 50% better throughput" over NetWare, he claimed. This is especially important because the firm's primary application is to process and access large legal files and accounting applications.

"We've found that as you start adding applications to the NetWare 3.12 server, the throughput slows down to a crawl," he said. The firm, therefore, opted not to migrate to NetWare 4. To deploy NetWare to perform the type of transaction processing his applications require "would kill the server and cost close to $100,000 more just for the hardware to run that kind of application on NetWare," Sommer explained.

Novell, meanwhile, says it's going to fight the NT onslaught on all fronts with something it calls "pervasive computing." The vision: to make NetWare and its directory services critical to every possible office computing task by linking it with Novell's UnixWare Unix operating system software, WordPerfect Perfect Office suite of desktop application software and Groupwise groupware package.

In other words, why not tie all networking components into a single environment, asked Novell Chief Technology Officer Sheldon Laube. Networking and internetworking for the enterprise, he said, are the basic tenets of corporate business for the next decade and beyond. And despite such an all-encompassing mission, he said, Novell is "*not* straying from our core competency in network operating systems."

Users and analysts aren't so sure. In fact, some longtime Novell customers are downright uneasy with the company's desire to try to be all things to all people. "Novell is stretched too thin these days, and it bothers me to see them going in all directions," said Alan Dolgoff, senior network specialist for the state of Minnesota Department of Revenue in St. Paul, a longtime NetWare shop.

Other users such as Gary Wilkerson, supervisor of end-user services at health care provider Kaiser Permanente Health Plan, Inc. in Atlanta, agreed. Kaiser Permanente has about 40,000 users companywide, most of whom are on NetWare.

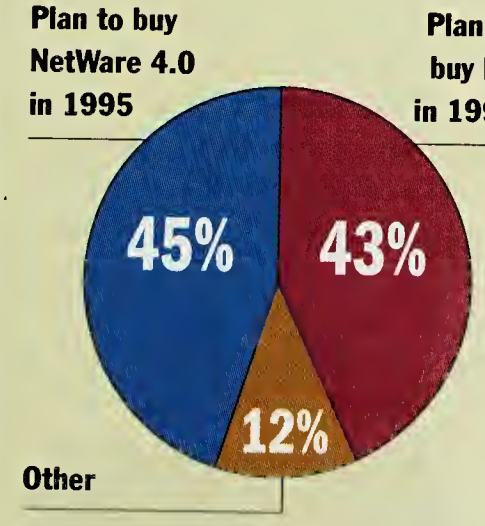
"Migration and technical support issues are very problematic for us," Wilkerson said, attributing the decline in aftermarket technical support directly to Novell's scattering its energies in multiple markets. But the level of support varies by division, he said: "I'm not uncomfortable with the NetWare Group — it's the Applications Group I don't like. They have no idea what they're doing or how to help me solve my problems."

Product support and the NT groundswell aside, Novell faces real challenges in transforming pervasive computing into a client/server strategy that jibes with its current product

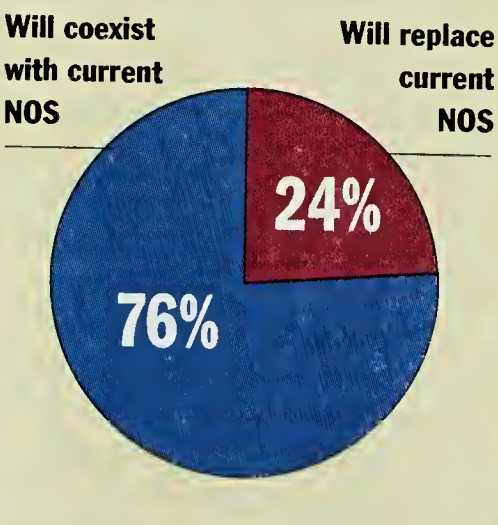
Please turn to next page

NOT SO PEACEFUL COEXISTENCE

There's little difference in the number of people planning to purchase NetWare 4.0 vs. Windows NT . . .



. . . and most who plan to buy NT said it will coexist with — not replace — their current network operating system



BASE: 300 NETWORK MANAGERS

Source: Sentry Market Research, Westboro, Mass.

The Missing Piece

Most industry watchers believe Novell's Achilles' heel, at least for the foreseeable future, will be its applications strategy — or lack thereof.

Novell has been trying for the past two years — without much success — to kick its oft-revamped AppWare strategy into high gear.

The company's original intent was to promote AppWare as the foundation on which all cross-platform development would be based. The strategy actually consisted of two initiatives. The first, the AppWare foundation, was a low-level application programming interface (API) for cross-platform connectivity. The second was Visual AppBuilder, a fifth-generation language, object-oriented programming environment.

But last November, Novell killed the AppWare foundation after it failed to garner support from the independent software vendor community. The rest of the initiative — Visual AppBuilder and Application Loadable Modules — has continued to evolve, insisted Sheldon Laube, Novell's chief technology officer.

These components were designed to let power users quickly develop customized applications, a capability that is crucial as businesses implement true distributed client/server networks.

To this day, however, the application strategy remains muddied, with no answers in sight.

"I don't understand Novell's AppWare strategy, and I haven't met anyone else who does either," said Ki Wilson, senior microcomputer analyst at Stone Container in Chicago.

Even Laube was willing to concede that the company must do a better job of formulating and delivering an applications strategy and then successfully marketing that strategy to corporate and third-party developers.

"It's clear to us that we haven't done enough for our application developers," Laube said. "But that will change. We are coming out with new sets of APIs, and we're recasting AppWare," he added, declining to be more specific.

Vague statements such as these without any accompanying product specifics or a detailed strategic road map have caused analysts such as Jamie Lewis at the Burton Group in Salt Lake City to remark that Novell still doesn't have a solid applications story to tell.

"AppWare is nothing but a visual application builder now," Lewis said. "Frankly, Novell doesn't have an applications server, and if they don't address the issue — fast — it will hurt them."

NOVELL'S APPWARE STILL NOWHERE

Continued from page 25

roster and positions the company for the next decade.

Chief among them is Super NOS, which will ship piecemeal in about 12 months. It's designed to meld the best of NetWare 4.1 (namely, its enterprise directory services) with UnixWare, the Unix derivative Novell acquired from AT&T Corp. two years ago. Inserting UnixWare, with its support of SMP, into the mix, is supposed to endow NetWare with the functionality to support bleeding-edge, client/server applications.

NetWare users, however, would like Novell to come clean on Super NOS specifics to ensure that it isn't more vaporware. And they'll get their wish in September when Novell renames the product, releases a product road map and touts an accelerated delivery schedule, Laube revealed.

NetWare chief scientist Drew Major claimed it's "not technologically tough to meld NetWare and UnixWare. The real challenge is in delivering the right feature and functionality set."

Pressure, anyone? If there is, Novell's not sweating it.

Most industry analysts say Novell is getting its house in order and running a hard race to make the successful transition to become an enterprise distributed computing player.

"NetWare will persevere, and it will be successful as an enterprise NOS, although eventually its 70% market share may erode to 45% or 50%," said Bob Sakakeeny, an analyst at Aberdeen Group, Inc., a Boston consultancy.

MANO A MANO

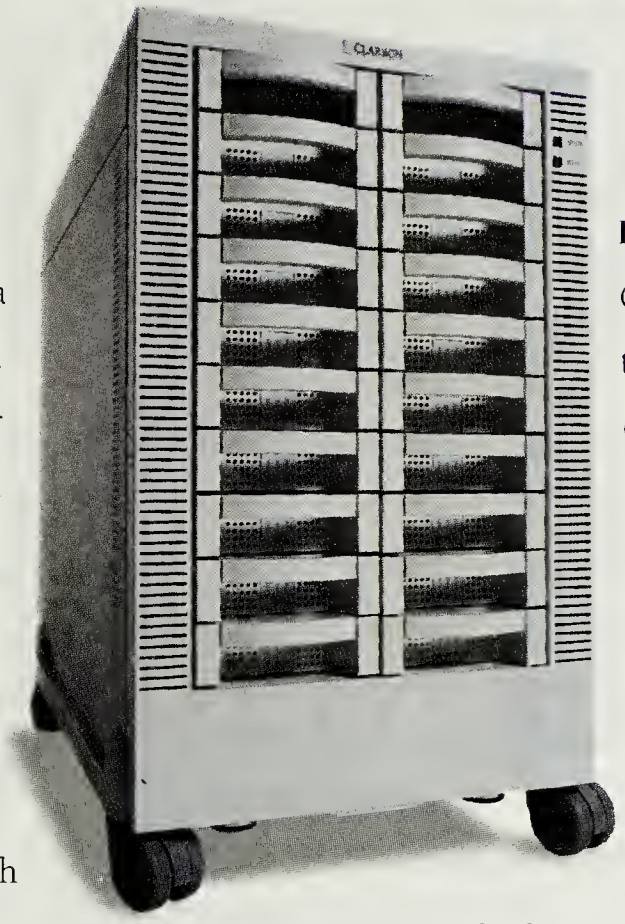
Novell and Microsoft are facing each other down with the top guns in their arsenal. It's NetWare and its directory services pitted against Windows NT Server's powerful application server engine. Fortunately for Novell, Microsoft isn't slated to deliver enterprise directory services capabilities to NT Server any time soon.

Ironically, Banyan Systems, Inc.'s Vines, though vanquished as a network operating system, could play the spoiler. Banyan has been promoting its crown jewel, Universal StreetTalk — arguably the best directory services software on the market — as an unbundled product. And the company would like to form a closer alliance with Microsoft.

If that happens, the combination of Windows NT Server and Universal StreetTalk could tilt the playing field in Microsoft's favor. But for now, it looks like a draw. ◩

DiDio is Computerworld*'s senior editor, Networking.*

THINKING *Outside* THE BOX



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Appalled by the explosive cost and complexity of managing geographically dispersed client/server environments, some companies have begun pulling the plug on their short-lived computing diaspora. Rather than adding servers to meet growing demands, these companies are going with a smaller number of larger servers that can handle a heavier processing load and more applications. They also create fewer headaches.

For every $1,000 a company spends on a server, it should plan to spend $9,000 on management and maintenance, according to the University of California at Berkeley's Haas School of Business. With figures like that, it's no surprise some firms are trying to pare down their server population.

"The amount of time and effort required with managing multiple servers is incredible," said Andrew Klein, corporate facilitator at Progress Software, Inc. in Bedford, Mass. Klein's department has gone from a high of five servers in 1991 to a single server today. In fact, Progress has streamlined its number of servers during the past four years — from 100 to 25 — to bring order to a system that grew from the ground up with little pruning along the way, according to Denis Goulet, manager of information technology operations.

In one instance, Progress replaced 100 Unix workstations doing double duty as file servers with one Auspex Systems, Inc. machine equipped with 30G bytes of disk storage and 16 network interfaces, Goulet said. And Progress managed to more than double the number of users supported on one particular system from 85 to 200 without increasing the time, manpower or money dedicated to maintenance.

In addition, "predictability is much better," he said. "We prefer to have fewer fault-tolerant servers than a whole bunch of less fault-tolerant servers."

For every centralizer, there is likely a company bent on further distributing its servers, said Susan Frankel, an analyst at International Data Corp. in Framingham, Mass. But a considerable number of firms are discovering that when it comes

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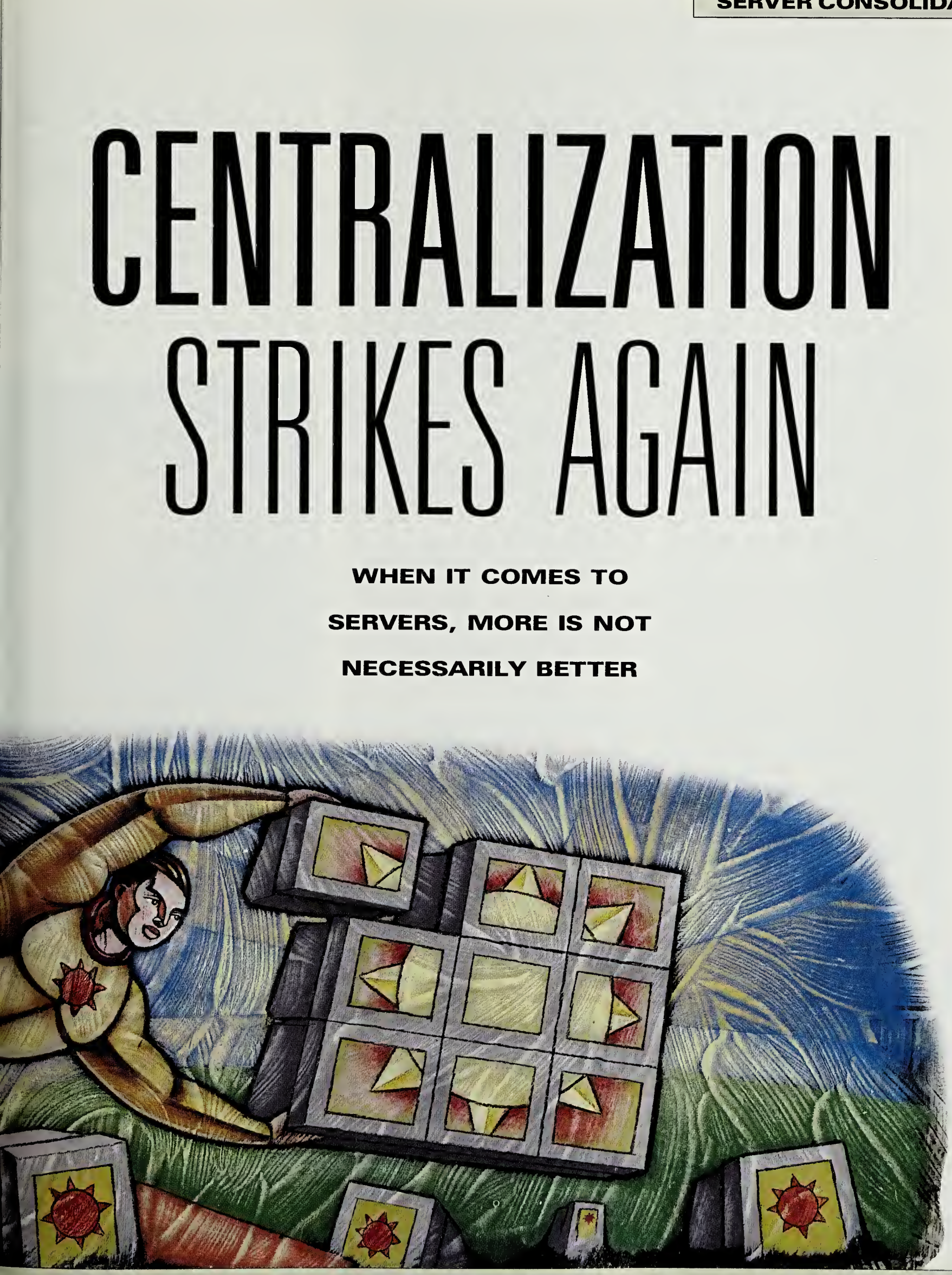
CENTRALIZATION STRIKES AGAIN

WHEN IT COMES TO SERVERS, MORE IS NOT NECESSARILY BETTER



BY AVERY JENKINS

ILLUSTRATIONS BY RICCARDO STAMPATORI

STURDIER SERVERS OWE DEBT TO SYMMETRICAL MULTIPROCESSING

Server consolidation would not be a trend if it weren't for scalable server architectures or servers optimized for specific functions. Using techniques such as symmetrical multiprocessing (SMP) and a RISC-like approach to file services, server manufacturers are now able to support workloads that would formerly have swamped a single server.

Using an SMP server and one of the 32-bit operating systems supporting multithreaded operations, users can parcel out tasks to any and all available processors. Thus, as processing power becomes the limiting variable in the system, more processors can be added with relative ease.

For example, the NetFrame Cluster Server 8500 from NetFrame Systems can support up to 12 clustered processors, with four 100-MHz Intel Corp. Pentium processors functioning as application servers. The system also provides 100M bytes of network I/O and supports Novell, Inc.'s NetWare 4.0, Unix and Microsoft Corp.'s Windows NT [see CSJ, February 1995, "What's New," page 60].

You would think that users, once they have the ability to add processors and memory, wouldn't ever need to add servers. Unfortunately, things aren't quite that simple. The overhead required to manage and synchronize multiple processors increases as the number of processors increases. So while a two-processor server can offer almost double the performance of a single-processor system, a four-processor server only triples the performance.

For instance, SMP systems require their own software layers in order to manage the intricate communications among processors and memory as well as to provide an interface to the operating system so standard applications packages can be used.

SMP is not the only technology being exploited for consolidated servers. Some companies, such as Network Appliance in Mountain View, Calif., and Auspex Systems in Santa Clara, Calif., offer servers whose entire design is built around rapid file service. While these servers provide only a single function, their improved performance enables them to support a greater number of users.

For example, Network Appliance claims its servers can support up to approximately 3,200 Network File System operations per second on the test bench.

These servers employ proprietary, streamlined operating systems that are analogous to RISC hardware. With a reduced set of commands to support, these servers can increase their performance dramatically.

Unfortunately, even the fastest processors can be strangled by inadequate I/O bandwidth, which is needed not only to provide a relatively open pathway for user requests but also to facilitate interserver communications. Perhaps most important, these servers require a large amount of bandwidth to support the RAID mass storage devices that are sitting behind them.

Like any solution, SMP and single-purpose engines have a finite range in which they provide the optimum combination of cost, performance and efficiency. Beyond that range, other technologies will provide a better way to support a large volume of users and transactions by employing multiple applications through a single, central location. Mainframe, anyone?

—Avery Jenkins

Continued from page 28

to servers, less can be more.

Kaiser Permanente's San Jose Medical Center has scrapped plans for a one-department, one-server approach in favor of a more centralized installation using far fewer application servers, said Del Morissette, the center's controller of data processing and telecommunications.

"We originally looked at putting one server for every 50 to 100 PCs," Morissette said. "That would have required 14 servers. Instead, we used two NetFrame servers," which support most of the center's needs, he said. In doing so, Kaiser reduced system costs by 25%, or $1 million, and also shrank its support staffer/end-user ratio to 1-to-150 — far better than the 1-to-100 or lower ratio commonly cited for client/server systems. "We spend far less time just going around and dealing with alarms," he said.

With fewer servers, Kaiser's Del Morissette spends far less time dealing with alarms

Similarly, Kenworth Truck Co. in Seattle scaled back maintenance and management time by 50% when it halved its server population, said Sanjay Anand, senior systems analyst at the firm. Kenworth achieved the gains by recentralizing its computer-aided design systems. "I used to work

PHOTOGRAPHY BY JOHN HARDING

30 hours a week. Now I work 50," Anand said.

The trend toward recentralization comes as no surprise to Ed Roche, a research fellow at the Center for Information Technology and Management at Berkeley's Haas School of Business.

In client/server, 90% of costs are attributable to management vs. 20% in the typical mainframe environment, Roche said. "It's an irony of the Information Age that a technology like computing that is supposed to save labor was released in a configuration that dramatically increases labor intensity for the entire infrastructure," Roche said.

NOT A SMOOTH RIDE

Not surprisingly, there may be a few political bumps on the road to a consolidated server environment. Morissette said he faced occasional strenuous user opposition to recentralizing applications. "Mostly, we had independent people used to running independently," he said. One department "just about mutinied on me," Morissette added.

Morissette's solution was to institute a "you need it, you get it" policy. "We said, 'All you have to do is define a business need for your application and you can have it,' " he said.

One way to avoid static is to leave some of the local applications behind when you reassert control over the data, said John Parkinson, director of technology at the Center for Business Transformation at Ernst & Young in Las Colinas, Calif.

Above all, the consolidated system must be able to provide the same level of responsiveness that the local ones did.

Thus, the megaserver of a consolidated system requires lots of I/O and a speedy network between client and server.

At Kenworth, Anand has equipped his two FAServers from Network Appliance with 100G bytes of RAID Level 4 mass storage and a LANnet switch that provides 1.2G bits in the backplane, or about 12

TRENDWATCH

SERVER CONSOLIDATION:
The process of reducing a large number of distributed servers to a smaller number of larger ones that support more applications and more users. Benefits of server consolidation include sharply reduced systems management and maintenance costs as well as improved reliability.

While the driving factor is economics, technological advances are fueling the trend. The ability to support SMP on Intel- or RISC-based servers means that these machines can be scaled to sizes large enough to support multiple applications and a large number of users without significant performance degradation.

10M-bit connections. The servers themselves are then connected via a Fiber Distributed Data Interface backbone, while users exist on multiple subnetworks.

With this topology, network volume on any one segment is kept to a minimum, while the servers have all the bandwidth they need to handle requests promptly. "We have gotten eight to 10 times faster" since consolidation, Anand said.

Morissette has also taken pains to provide adequate bandwidth. Each of his NetFrame Systems, Inc. servers is equipped with four I/O processors, allowing each to support 200 users without degradation. "I get incredible throughput," he said.

But that throughput would be inadequate without the processing power inside to handle the requests. NetFrame, like other large-scale servers, employs symmetrical multiprocessing (SMP) to achieve improved performance while supporting a larger number of users (see story page 30).

By using an SMP architecture to delegate tasks to the most appropriate piece of hardware, Progress developers have gained a significant performance advantage, according to Klein.

"A consolidated NFS file server with 25 commands is less complex to run than a Unix file server with 300," Anand said.

Despite such gains, users and analysts warned that consolidation strategies aren't always the most appropriate direction.

Just as in the days of the mainframe, a reduced number of servers makes survivability an issue, said Hugh Ryan, director of new age architectures at Andersen Consulting. Although it cuts down on troubleshooting efforts, having a few servers in the same location creates a single point of failure, which may be unacceptable for some companies or applications.

Functions that make particularly heavy use of network bandwidth, such as client/server imaging, are poor candidates for consolidation, as are special-purpose applications that only one small group will use.

At Kaiser, for example, Morissette said he will use local processing power for video information kiosks located in departments such as pediatrics.

Decisions about whether to consolidate and if so, which servers, should be made strictly on technological and economic bases, users and analysts concurred. While end users may protest their immediate loss of ownership, "to the extent that they get the same service, the end users couldn't care less," Roche said. ◩

Jenkins is a freelance writer in Ansonia, Conn.

The Dark Side of Data Warehousing

BY TONY BAER

There's one thing you can count on with large data warehouses: They get awfully big, awfully fast.

In fact, nearly 60% of information technology managers expect their warehouses to grow beyond 50G bytes by mid-1996, according to a recent survey of Fortune 250 warehouse projects conducted by Meta Group, Inc. in Westport, Conn. And those numbers may be conservative. "We're seeing data doubling every year, while the number of users can easily double or triple," said Tim O'Leary, vice president of Epsilon Corp. in Burlington, Mass., a systems integrator.

"Users are like alcoholics. Give them numbers and they'll always want more," agreed Chris Lange, database administrator at National Semiconductor Corp. in Sunnyvale, Calif. Ongoing requests for more types of information doubled the firm's warehouse size to 15G bytes over three years.

O'Leary recommends estimating disk requirements, then doubling or quadrupling them. Price Waterhouse advises clients to budget at least 25% to 50% more for unexpected growth, said Michael Schroeck, who heads the company's national data warehousing practice in Chicago.

At Mervyn's in Hayward, Calif., the data warehouse inflated to 700G bytes, roughly four times early estimates. "While [the database administrators] had most of the data elements, they didn't realize how much work space and indexing would be involved," said Mary McCormick, the firm's former director of planning and technology.

Data warehouses get overgrown fast, so think big from the start

The degree to which data is denormalized or striped across multiple disks also inflates storage. RAID storage eats up an additional 15% to 20% of space.

And storage can get complicated, said Richard Winter, a Cambridge, Mass., consultant who specializes in very large databases. Above the 50G-byte threshold, spindles, channels, disk controllers and other components may have to be added or expanded in greater proportion to the amount of incoming data to maintain decent performance.

On the network design side, you need to balance large packets of data, a large number of transactions or both. Preferably, the gigabyte slices of data should be processed on the server.

"Most people don't want to get 20,000 rows of data back," said Duncan Witte, a Dallas-based data warehousing consultant.

Mervyn's started with a server-heavy architecture but discovered frequent requests for business views were causing bottlenecks. So now it is moving meta data tables from the Dallas-based master repository to local LAN servers.

A crucial item in the equation is usage. Knowing the types of users can be more important than the number of users.

At John Alden Life Insurance Co. in Miami, only a few dozen of the company's 4,000 employees are likely to use the warehouse. But, said Sullivan McConnell, information systems manager, they are power users who often create intermediate tables up to a gigabyte apiece.

To keep from getting caught behind the 8G-byte ball, IT staffers may have to play amateur psychologist. Ask users what information they want, then try to predict what else they'll really want when the warehouse finally goes on-line. ◩

Baer is a freelance writer in Newton.

ILLUSTRATION BY GARY BASEMAN

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WHERE DISTRIBUTED COMPUTING MEETS BUSINESS OBJECTIVES

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time line

A CASE STUDY

Implementing Client/Server Technologies and Strategies at the Michigan Department of Transportation

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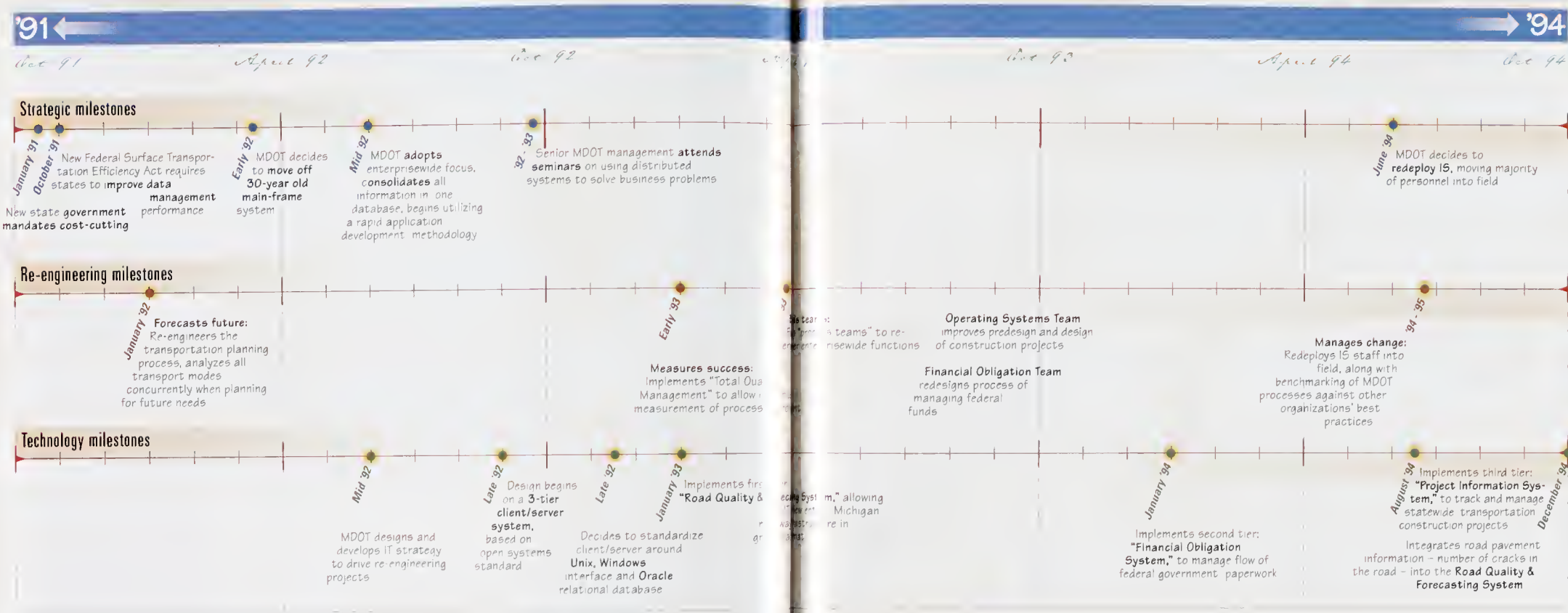


a bathtub," says Jeff Arbour, a client relationship manager at Unisys Corp., one of the MDOT's early advisers on the project. "It was a monumental effort, and Mike needed all the input he could get."

Unisys staff members escorted 120 MDOT managers to an East Coast seminar on using distributed systems to solve business problems. The company also consulted on business process re-engineering projects in the human resources and project programming areas and provided key hardware pieces of the MDOT's client/server network.

"We first became involved the day Mike [Cleary] told me they were throwing out our mainframe," Arbour recalls. "After I restarted my heart, I asked how we could help him migrate to client/server. What could have been a loss for us turned into a positive consult lationship. Our business is cha and this engagement helped u valuable experience in distribute puting."

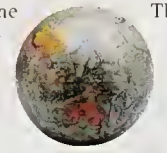
Cleary says Unisys never t put the genie back in the glass "Unisys people turned out to be change agents," he says. "I hadn't expected that."

On the road to the Great Wall,

Clear and his team confronted numerous challenges. Among the most intractable was gaining the commitment of the IS group. "The DOT culture was encapsulated in IS," Cleary explains. "The mainframe data center people controlled the information and dictated the flow. They didn't want to give that up."

Re-engineering IS was even tougher because the group's activities cut across the entire department. "IS always has 10 different projects going at the same time," Cleary says. "Invariably, 3,500 people got in the way every time we tried to make a change."

Things began looking up in early 1994 when the MDOT decided to get off the mainframe and redeploy key IS personnel into the business units. Of the 17,000 programs running on the mainframe early last year, only 4,000 remain. And last March, the state Department of Management and Budget took control of the MDOT data center under an outsourcing arrangement.



As of January 1995, 70% of the IS staff has been redeployed into the field, Cleary says. Also, a 2-year-old effort to establish computing standards for a client/server environment has provided a strong technological framework. Those standards include a TCP/IP networking backbone; Novell, Inc.'s NetWare network operating system; Microsoft Corp.'s

As an information management company,

Unisys acts as a solutions and systems integrator

for business and government,

complementing those integration skills with

a full range of consulting and implementation services,

information technology and vertical industry expertise.

The company's perspective extends beyond

supplying technology to delivering comprehensive

information management solutions.

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October Issue

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A look at how successful the railroad industry has been in business process reengineering to regain a foothold in the transportation industry. Does it pose a competitive threat to trucking and what are trucking companies doing to remain competitive?

Product Focus: Database Tools

Our Firing Line feature compares ODBC drivers.

Careers Column: Grooming technical managers for project management.

COMPUTERWORLD CLIENT/SERVER JOURNAL

Where distributed computing meets business objectives

It's 2010

a look into the labs

DISTRIBUTED COMPUTING IN THE NEXT MILLENNIUM AND HOW IT WILL AFFECT THE WAY YOU WORK

You're the CIO of a Fortune 500 multinational. You're on your way to the CEO's executive staff meeting at corporate headquarters.

Yes, the chief executive officer still insists on these old-fashioned meetings, even though most business is conducted electronically over the worldwide network. Video and audio hookups, electronic mail (containing images as well as text) and sophisticated workflow applications allow functional teams to work together no matter where they're physically located.

The meeting room contains more video screens than people. Sunken monitors embedded into the table can link in any absent member from anywhere in the world.

Occasionally, someone will reinforce a point with graphical data, accessed by murmuring a few words into one of the microphones hidden in the tabletop or by lightly touching the screen in front of him. Brilliant

Virtual worlds that people can enter via computers and dial-up modems have been around for more than a decade. Called Multi-User Dimensions, or MUDs, these were used for free-form adventure games such as Dungeons and Dragons. Users enter a virtual space — a real-time electronic bulletin board — and participate in the activities taking place there.

Lately, researchers have been exploring the nongame possibilities of MUDs. Their hope is that "MUDs can broaden the social bandwidth of today's rather flat electronic interactions," said Paul Saffo, director at the Institute of the Future, a technology think tank in Menlo Park, Calif.

Xerox PARC in Palo Alto, Calif., has been exploring the larger impli-

BY ALICE LAPLANTE

graphics flash across all of the screens, showing market share, profit margins, research and development expenditures.

New product development is discussed, and heads turn toward you: Can the network handle the global collaboration required? Whatever you don't know off the top of your head you extract from personal and corporate databases around the world, available through a few words or gestures.

Toward the end of the meeting, an alarm flashes on the screen in front of you: Your personal software agent has noticed that the team in Pittsburgh replacing the last legacy manufacturing system has fallen behind schedule. You leave video mail for the team leader, asking him for an explanation.

Back to reality. From the vantage point of August 1995, the business world of the future looks pretty sci-fi. But the technology underpinnings are really nothing new: Voice, gesture and handwriting recognition, real-time videoconferencing, intelligent software agents and personal digital assistants have been under development — and have even ridden the commercial-success roller coaster — for several years.

In fact, much of the technology we consider mainstream today — mouse-driven PCs, object-oriented development tools, Unix-based relational databases, Ethernet networks — took root in the '60s and '70s in university computer science laboratories and research incubators, such as Xerox Corp.'s Palo Alto Research Center.

But like memory-hungry 32-bit applications in need of heavy-duty disk compression, technology development and product life cycles are moving at nanosecond clips. That will force many of these technologies out of the lab and into our working lives by 2005. Like the mouse, GUI and relational database, they will dramatically impact distributed computing in the next millennium.

cations of MUDs in its Jupiter project. Researcher workstations at Xerox PARC sites in California and England and at home offices now have microphones and video cameras.

A Xerox PARC employee in England can "walk into" a colleague's office in California by initiating a video hookup. After receiving some clues that someone is electronically approaching, the colleague will see the visitor's face appear on his screen.

Electric Communities, a Los Altos, Calif.-based think tank and software house, is taking MUDs one step further to create protocols and interfaces that would allow businesses to build "information marketplaces" on a global scale. Electric Communities' tools would allow businesses to create places on the World Wide Web where people could meet virtually.

"There's always been a strong social component to commerce," pointed out Douglas Crockford, president of Electric Communities.

MUDs promise to have a huge impact on distributed computing, Saffo said. As the corporate workforce becomes more dispersed, information systems must somehow supplement the face-to-face interactions that define corporate culture today.

"The success of electronic business communications is dependent utterly on being able to give people the same social richness in cyberspace as they get in face-to-face interactions," he said.

Please turn to next page

Client/Server Origins

MANY TECHNOLOGIES WE TAKE FOR GRANTED TODAY SPENT YEARS INCUBATING IN RESEARCH LABORATORIES

1960s

■ Researchers at Bell Laboratories begin work on cell-switching, which is later called ATM.

1963

■ Douglass Engelbart at Stanford Research Institute patents the "X-Y Position Indicator for a Display System," later known as the mouse. Xerox uses a mouse and GUI nearly 20 years later on its Star computers. In 1984, the Macintosh debuts.

1969

■ Unix is born at the hands of Bell Labs' Ken Thompson and Dennis Ritchie. The first commercial license is sold in 1977 to Interactive Systems Copr. in Santa Monica, Calif. But Unix doesn't take off as a business system until the mid-1980s. In 1989, Motif and OpenLook give Unix a graphical look.

■ The U.S. Department of Defense installs the first experimental Arpanet node — the first packet-switched network. Arpanet evolves into the Internet, which doesn't catch fire in the business world until the early 1990s.

■ E. F. Codd publishes the first paper to define relational database management systems. Eleven years later, Oracle releases the first commercial RDBMS to use SQL.

MID-1970s

■ The Defense Advanced Research Projects Agency develops TCP/IP to interconnect satellite and radio-packet networks to the Arpanet. Today, TCP/IP is the protocol of choice to link disparate systems across WANs.

Continued from page 35

DIGITAL INFO ON DEMAND

The paperless office concept has been around for so long, it's become somewhat of a joke. And today's pundits are careful not to say paper will disappear. What will happen is we will be able to electronically access all sorts of information on a global scale, said Sam Fuller, vice president of corporate research at Digital Equipment Corp. in Littleton, Mass.

The notion of widely available digital information has inspired companies to experiment with alternative electronic distribution mediums. IBM's Thomas J. Watson Research Center in Yorktown Heights, N.Y., for instance, is developing interactive television applications through which businesses could sell products and services via a web of video and data servers. This service would deliver movies on demand, video clips, electronic catalogs and database access, said Bill Tetzlaff, manager of operating system technology.

A catalog company, for example, could reach customers through personalized electronic transmissions based on internal knowledge of buying habits as well as data culled from other, external databases. This could be combined with immediate on-line confirmation of order quantity, prices and delivery dates, Tetzlaff said.

The project involves emerging technologies such as digital coding and compression, asymmetrical digital subscriber lines, direct broadcast satellite and multichannel, multipoint distribution systems.

It will be at least a decade before infrastructure and standards issues are resolved, Tetzlaff said, especially high bandwidth, low-error optical fiber cable, emerging satellite and wireless technologies and availability of interactive TV.

OBJECT ABSORPTION

Object technologies first appeared in the late 1960s and early 1970s, with much of the pioneering work being done at Xerox PARC. Now mainstream, object theory is being incorporated into other technologies.

Most significant is the merger of relational and object database concepts, said Jim Althoff, vice president of software products at software maker Aspect Development, Inc. in Mountain View, Calif., and a former senior member of the Smalltalk development team at Xerox PARC.

Relational systems can't support the nonstructured data types that object databases can. Yet pure object

The Ultimate in Portability

CARNEGIE MELLON ENVISIONS WEARABLE COMPUTERS BY THE YEAR 2000

Aircraft maintenance workers participating in a pilot test at The Boeing Co. in July were able to throw away the clipboards and pencils that were once necessities when they inspected military tanker planes for defects.

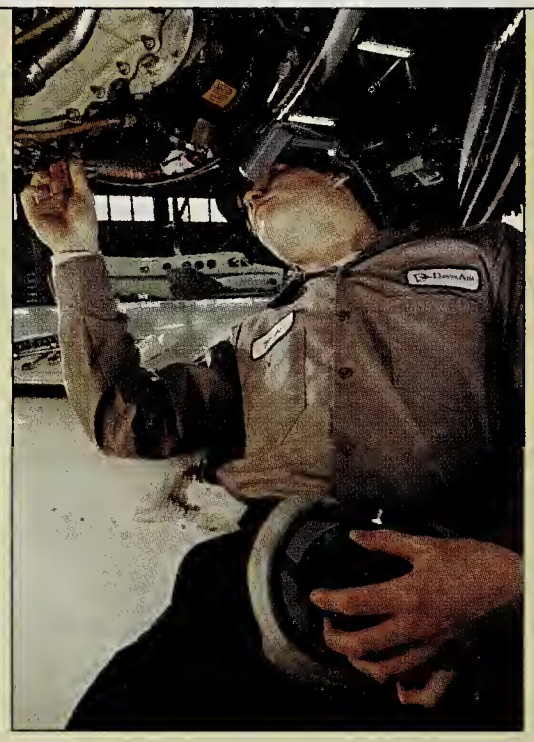
Using prototype "wearable computers" developed by the Engineering Design Research Center at Carnegie Mellon University in Pittsburgh, the workers crawl over the wings and cockpit wearing 4-pound, 486-based computers that fit into the small of their backs. On their foreheads, they wear VGA-quality transparent monitors that give them a full field of vision but let them call up three-dimensional diagrams of the cockpit or other airplane mechanics, request step-by-step instructions on any procedure and enter data into a remote database — all with voice commands.

Repair requests are immediately broadcast via radio waves to a Boeing logistics computer server, which then automatically orders the appropriate parts and even schedules the date and time for the repairs.

"It's the next paradigm shift — detaching people completely from the physical constraints of computing," said Dan Siewiorek, director of the Engineering Design Research Center, which created successive generations of the "Vu-man" series of wearable computers, of which the Boeing computer is the latest example. Siewiorek said he sees these types of devices becoming prevalent by the year 2000.

Because workers' hands need to be free, the system uses either voice recognition or a large rotary dial to enable them to move through on-screen lists, enter data or request additional information. The dial is similar to the old rotary phones.

Devices such as Vu-man 3 will not necessarily be relegated to maintenance, inventory and similar applications. "Look at the spreadsheet. When it was first introduced, no one had any idea of the size of the market," Siewiorek said. "People thought it would be a specialized tool for accountants and financial analysts."



Boeing maintenance workers pilot Carnegie Mellon's Vu-man, which weighs 1.75 pounds and uses eight AA batteries

databases lack the common query language and robust database services that relational databases offer.

This merger "will be critical for helping IS handle the massive amounts of highly dynamic data [distributed in] the workplace, without throwing away their installed base," Althoff said.

Other database pioneers agree and are attempting to commercialize this concept. Michael Stonebraker, professor of computer science at the University of California at Berkeley, headed the Postgres project there, which was recently spun off into a commercial venture at Illustra Information Technologies, Inc. in Oakland, Calif., where he is chief technology officer.

Illustra's database management system manages complex multimedia data types, with the eventual goal of transforming into what Stonebraker called "a location-transparent, heterogeneous database system." Users would not have to worry about data type, location or storage format.

Stonebraker said he expects this capability to reach the commercial market within three years and to be almost immediately absorbed into mainstream information systems.

But still in the Berkeley lab is technology to enable databases to transcend departmental or even corporate boundaries and thus eliminate a central point from which the data and/or queries are being managed.

"We're working on a query broker that will negotiate the most efficient way to answer a query among all the various sites on a distributed network," Stonebraker said.

COMPUTER UBIQUITY

By the year 2010, no one will think of computers as discreet objects. Instead, technology will reside wherever the user happens to be: in the car, at his desk, at the kitchen counter.

"We won't even think of computing devices as computers," said Dan Siewiorek, director of the Engineering Design Research Center at Carnegie Mellon University in Pittsburgh. The center's line of "wearable computers" is just that: computing devices designed to be worn on the user's body to provide the ultimate in distributed processing (see story page 36).

"Virtually everything will have some sort of computational device built in to it and, equally importantly, the ability to communicate to other computational devices," said Gerrold Grochow, CTO at American Management Systems, Inc. in Fairfax, Va.

Utility companies already put intelligence into meters, which then send out radio signals and interact with customer billing databases, he said. Automakers are embedding motion sensors and satellite receivers that interact with remote databases. "The lines will become increasingly blurred," he said.

In some situations, there will be no room or need for keyboards. Steven Holt, strategic design manager at Frogdesign, a Sunnyvale, Calif.-based design firm, heads a research team that is working on replacements for the traditional QWERTY keyboard. He said he anticipates that voice and gesture will almost completely replace keyboard and mouse input within 10 years.

"In future computing devices, software becomes more like hardware, where the user interface begins to change from being purely an on-screen interaction to something that can involve external controls, knobs, levers or gestures," Holt said.

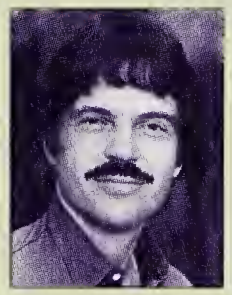
One side effect: Application development will require a multidisciplinary effort. Electrical engineers, integrated circuit designers, mechanical engineers and manufacturing professionals will become a critical part of the team.

INTELLIGENT AGENT

Apple Computer, Inc. was an early proponent of "intelligent agent" technology. Its Knowledge Navigator video, released in the late 1980s, introduced a bow-tied electronic assistant who popped up as a full-motion video

Please turn to next page

1972



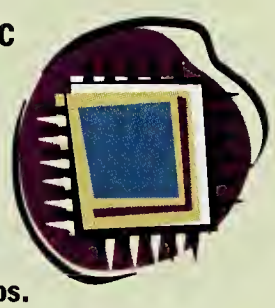
■ Alan Kay develops Smalltalk for a Xerox PC. Eleven years later, Digitalk delivers object-oriented programming to PCs through Smalltalk/V. Today, object-oriented concepts are ingrained in almost every client/server tool, though few standards exist to facilitate object interoperability. Microsoft's OLE technology, announced in 1990, is the object model of choice for Windows, while the Object Management Group's CORBA, introduced in 1991, is forging a distributed standard.

■ ISDN standards are started by the CCITT, making way for speedy, high-bandwidth voice/data networks. The technology is not seen as commercially viable until the mid-1990s.

1973

■ Ethernet is developed at Xerox PARC and becomes commercially available in 1980. In 1983, Novell's NetWare is born as the first LAN operating system to run on it.

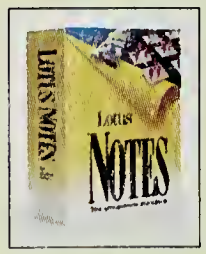
1974



■ IBM develops the RISC chip but doesn't commercialize it. Eleven years later, Mips Computer Systems, later Mips Technologies, ships the first RISC chips. HP and Sun closely follow, setting up a horse race with Digital among hardware vendors to achieve price/performance leadership.

1978

■ Britton-Lee, later ShareBase Corp., is founded to develop massively parallel processors. In the '90s, it files for bankruptcy. Digital's VAXclusters, introduced in 1983, take a loosely coupled approach that foreshadows today's highly integrated, symmetrical multiprocessors (SMP).



■ Consultants Judy and Peter Johnson-Lenz introduce the term "groupware" — "an intentional group process plus software to support it." Eleven years later, Lotus' Notes is introduced, but three more years pass before groupware is popularized.

1981

■ **IBM enters the PC market.**

■ **Osborne Computer Corp. releases the first portable computer, called The Osborne. The company files for bankruptcy two years later.**

1982

■ **Sun is founded and will later popularize the notion that "the network is the computer."**

1983

■ **Wollongong Group establishes the first commercial installation on the Internet.**

■ **Quarterdeck introduces Desq, the first multitasking, windowing interface. IBM follows with Top End in 1984. Meanwhile, Microsoft preannounces Windows, which comes in '85.**

1984

■ **MIT launches Project Athena, a joint experimental program that leads to the X Window System, released in 1985.**

1987

■ **PeopleSoft, one of the first to sell off-the-shelf client/server applications, is founded.**

■ **Remote procedure calls — the first middleware — are made available on Unix systems.**

1990

■ **Banyan's Vines SMP is the first network operating system designed for SMP.**

1991

■ **EO, founded by AT&T, introduces the first wireless "personal communications services" device. EO folds in 1994. Apple's Newton MessagePad is introduced in 1993 and flops commercially. Other PDAs follow, with minimal success.**

1993

■ **McCaw activates the first CDPD wireless network in the nation, called Airdata. FedEx is the first commercial user, a year later.**

Information was compiled by Computerworld *intern Amy Malloy.*

Continued from page 37

image on the screen, filtered out unwanted phone calls, highlighted breaking news and coordinated complex requests for information from a variety of disparate sources.

In more prosaic terms, an agent is network software that can be programmed with specific rules to complete tasks on behalf of a designated user. Today, this technology is primarily applied to systems management, electronic mail and related groupware applications.

Recently, several intelligent agent technologies have emerged from university labs to help users navigate the Internet. The University of Washington in Seattle, for example, recently completed one such project. Called the Softbot (for Software Robot), it uses artificial intelligence to help users make sophisticated queries and searches on the Web.

One intelligent agent commercially released in January gets raves from technology visionaries such as Frank Casanova II, director of advanced technology evangelism for the Advanced Technology Group at Apple. Called Wildfire Assistant, this telephone-based electronic helper from Wildfire Communications, Inc. in Lexington, Mass., takes orders through natural, spoken commands.

The user is assigned a single Wildfire Assistant phone number. It takes messages like a voice-mail system, but it uses speech recognition instead of requiring callers to use a Touch-Tone keypad to select options. Callers can be screened or connected directly to a user at any phone in the world. Users can also leave personal messages for designated callers, and the system can schedule follow-up calls or meetings.

What's the critical requirement of these agents of the future? "They can learn. They can make leaps of logic," Casanova said.

BANDWIDTH EXPLOSION

Most industry leaders expect digital telecommunications connections to vastly supplement — if not replace — analog phone lines by 2005. Integrated Services Digital Network and Asynchronous Transfer Mode will allow rapid, simultaneous transmission of voice, video and data. Infrared, radio and Cellular Digital Packet Data wireless technologies will allow high-speed wireless transmission of voice, video and data over cellular satellite networks.

Additionally, research on gigabit-per-second networks is being sponsored on a wide scale by grants from the federal government. This technology promises to eliminate bandwidth as a barrier altogether. For example, Washington-based Advanced Research Projects Agency is funding the Advanced Technology Demonstration Network, which operates at a stunning 2.4G byte/sec. when connecting more than 100 government sites in an initial pilot test.

"When communications costs finally drop below processing costs, then information management costs become the driving force behind IS decisions," said Allan Paller, director of open systems at Computer Associates International, Inc. in Islandia, N.Y.

Paller said he sees a future in which clusters of centralized processing hubs store and process virtually all corporate data. Astonishing and cheap communications bandwidth will allow businesses to install a large number of decentralized MIPS outside these hubs, but they will be used primarily for voice, image and video processing.

Exciting stuff, but here's a cautionary note: "The real challenges have very little to do with technology and everything to do with changing existing social behaviors," said William Davidow, general partner at venture capital firm Mohr, Davidow Ventures in Menlo Park, Calif. "I suspect that our ability to adapt our social organizational skills to incorporate these technologies will be as tenuous 20 years from now as it is today." ◩

LaPlante is a freelance writer in Woodside, Calif.

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Ricardo Bartra
Manager, End-User Computing
Alamo Community College District
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Client/Server Growing Pains

JUDITH HURWITZ

Hurwitz is president of Hurwitz Consulting Group, Inc., a Watertown, Mass., consulting, publishing and research firm specializing in development tools, client/server infrastructure and systems management. You can reach her at jhurwitz@world.std.com.

FIRST-GENERATION CLIENT/SERVER APPLICATIONS WERE TYPICALLY BUILT WITH SHORT-TERM GOALS IN MIND. WHAT DO YOU DO WITH THEM NOW?

The New Legacy Systems. What do I mean by that? I'm talking about all of the applications built with low-end, client-oriented tools that could wreak havoc in your organization.

Don't get me wrong. User organizations have achieved a lot of productivity with first-generation client/server tools. They've created applications quickly to meet short-term objectives.

But there is a problem on the horizon that you'd better start thinking about before it's too late: first-generation legacy environments. In many ways, these legacy systems are much worse than those systems in the mainframe environment. Let me explain why.

The problems with mainframe legacy applications have become relatively clear: They are difficult to manage and change. But in their favor, they typically have been documented — at least to some extent. Some poor soul in the information technology department takes responsibility for making sure data has been checked for accuracy and that the application is maintained. In fact, sometimes these applications are managed to an extreme.

Let's contrast this with first-generation client/server applications. These are typically developed as either pilot projects or tactical departmental efforts. They also tend to be written relatively quickly, often by a casual, non-full-time developer.

If the developer is a nonprogrammer, he will typically stick with one tool, such as Microsoft's Visual Basic, and write an application. This low-end tool will undoubtedly be appreciated by professionals who are starved for something that will help solve immediate problems.

But as a result, these applications are often undocumented, and only our casual developer has the slightest idea how the application was built. Even if a professional programmer has built the application, he has most likely added a lot of third-generation language (3GL) code into the mix.

Now there are two legacies: the code from the low-end tool and the 3GL code. Because this development effort is not a typical production application from IT, the application will also lack documentation or data integrity controls or verification of business rules.

This was quite acceptable for a short-term project with a tight deadline. But more often than not, these projects have a life span well beyond their anticipated duration. In some cases, managers will ask for more and more functionality to be added. Now the application moves from being tactical to being strategic.

The problem, of course, is that you have the worst of all possible worlds: unsupportable, undocumented, unreliable code that is needed to run the business. The lack of even the simplest of controls puts the integrity of the organization's data and business rules at risk.

What should you do? Well, first review any early client/server applications already in place. Is there documentation for the application? Can you check and verify the underlying business rules and then document them? Is this application one that will be discontinued shortly, or will it last for a number of years? If it is truly short-lived, relax and don't worry.

But if the application has strategic value and will grow larger and more complex over time, consider rewriting the application with a more scalable tool. If the complexity won't change much, still change the emphasis from quick and dirty to fast and verified. ◩

PHOTOGRAPHY BY STEPHEN SHERMAN

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great expectations... lesser results

IT'S A DELICATE BALANCE BETWEEN PROMOTING A NEW SYSTEM AND PUMPING UP USERS' IMAGINATIONS ABOUT WHAT THE SYSTEM WILL DO

Michael Benson remembers the exact moment when user expectations got out of control.

Benson, director of human resources information systems at Nestle USA, Inc. in Glendale, Calif., was in the midst of a two-year client/server conversion of a dozen disparate human resources/payroll systems affecting 23,000 Nestle employees nationwide.

The conversion is intended to do two things: simplify reporting and decrease labor and licensing costs. Some processing would be centralized on a Hewlett-Packard Co./Oracle Corp. server in Tempe, Ariz., while other functions, such as data entry, would be distributed on 20 file servers in the five U.S. Nestle companies.

Each of the sites will have its own LAN and direct on-line access via a frame-relay network to the production database. A PeopleSoft, Inc. client/server system will administer the applications from headquarters.

Here's where the issues began to surface: The systems in place varied widely in functionality, from PC-based software to outsourcing agreements with full-service human resources providers. The latter

BY STEVE ALEXANDER

group fully expected the new system to cover all the capabilities to which it had grown accustomed. Hence the staffers' dismay when they learned they'd have to temporarily go without things such as salary administration and position management.

"We're only doing basic employment and job data with this phase," Benson explained. "The next phase will get into [more sophisticated areas]. For the [groups that] are already doing that [with the current systems], it's a hard pill to swallow."

REALITY VS. EXPECTATION

Benson's dilemma is common among information systems managers, who must either keep user expectations of new systems performance from getting out of control or inevitably face user disappointment.

"Generally, when users see two or three real good features of a system, they develop euphoria," Benson said. "It's important to bring people down to earth. The real key is getting people to understand what it would cost to achieve their expectations."

Benson and his group tried to explain these trade-offs, but users preferred to focus on why the new client/server system would not match the performance of the existing systems. "People got mad at me when that happened," Benson said.

Project managers in the Nestle companies, including the angry managers, were invited to headquarters to see the first system go live. Benson used the occasion to discuss user goals and requirements.

"The primary goal was to give them a warm and fuzzy feeling — to show them a real system that really worked and was calculating paychecks. It kind of kept them in the loop, even though their companies were not doing it yet," Benson said.

At the same time, Benson didn't want the system to jump through too many hoops: "We didn't want to get

Please turn to next page

To deal with users' expectations, Bob Moran, IT director at Carrier, has given his client/server group the mission of educating company executives

PHOTOGRAPHY BY BOB MAHONEY

Continued from page 43
them too excited because then it builds expectations," he said.

But sometimes user expectations are raised by things beyond an IS manager's control. Just ask Bob Moran, director of information technology at Carrier Corp., a division of United Technologies in Syracuse, N.Y., that manufactures heating, air-conditioning and ventilating equipment.

He's had to deal with users who wanted an elaborate client/server electronic-mail system designed not just for employee communication but also for ordering equipment. That was fine, but the users were under the impression that because the system was PC-oriented, they could get it cheaply.

FALSE IMPRESSION

"Senior and junior management have the impression that as we move from mainframe to client/server, it means PCs and Windows and shrink-wrapped software. So they say, 'Why can't we do it here in the business when we can do it at home?' Their expectation is that we should be able to implement the PC system in a week for $1,000 per user compared to $5 million in five years for the mainframe."

But as Moran pointed out, only about 30% of the cost of client/server is hardware; the rest is people-related. "So the problem of expectations is significant," he said.

To deal with the problem, Moran has made education a priority. "I have a client/server group, and part of their mission is to create awareness and understanding to convince executives that this is not the same as putting Lotus on a home computer," Moran said.

Sometimes it's the versatility of a new client/server system that sets user imaginations on fire: Users find new ways to use the system beyond what IS ever envisioned. IS organizations may be tempted to lay down a few rules in hopes of curbing runaway user expectations, but that doesn't always work.

At Baltimore Gas & Electric Co., for instance, senior planning analyst Dennis Hoover tries to get business units to consult IS before buying software packages. But his pleas are often disregarded.

Frequently, users must discover they've made a mistake before they'll come to IS for help, Hoover said. He recalled one user who bought decision-support software without consulting IS, only to discover that it would not run in conjunction with other office applications such as electronic mail and a desktop organizer.

"Once users have gone down that path and wasted time and money, they come back and ask us what they should do," Hoover said. "But we're trying to get ahead of that. It all goes back to education: We're trying to make them aware of how fragile that workstation configuration is."

NO RULES TO LIVE BY

Moran said controlling the expectations of users who want to "improve" their own desktop systems is a continual problem for IS because there are no clear-cut rules to live by. "It becomes an ongoing management problem because you can't clearly define what they can modify and what they can't," he said.

It sounds like a tired cliche, but good educational campaigns can go a long way toward reining in user expectations.

"I think it's tempting to ignore or even forget the education that has to take place for the user population — something that can be as basic as how to use Windows," said Eric Singleton, director of IS at AlliedSignal Technical Services Corp., a Columbia, Md., information technology product and services provider. "That lack of education creates an image that this application doesn't work. The real answer often is that they didn't know how to use it." ◩

Alexander is a Minneapolis-based journalist who reports on technology.

words to the wise

DENNIS HOOVER
Senior planning analyst, Baltimore Gas & Electric Co., Baltimore

Three years ago, developers at BG&E delivered a client/server-based information tracking system more powerful than anticipated. Users were baffled by it. This drove Hoover's group back to including end users in early-stage planning. He advises companies to do the same. Ask end users if the prototype is what they wanted, he said, and if not, offer to change it.

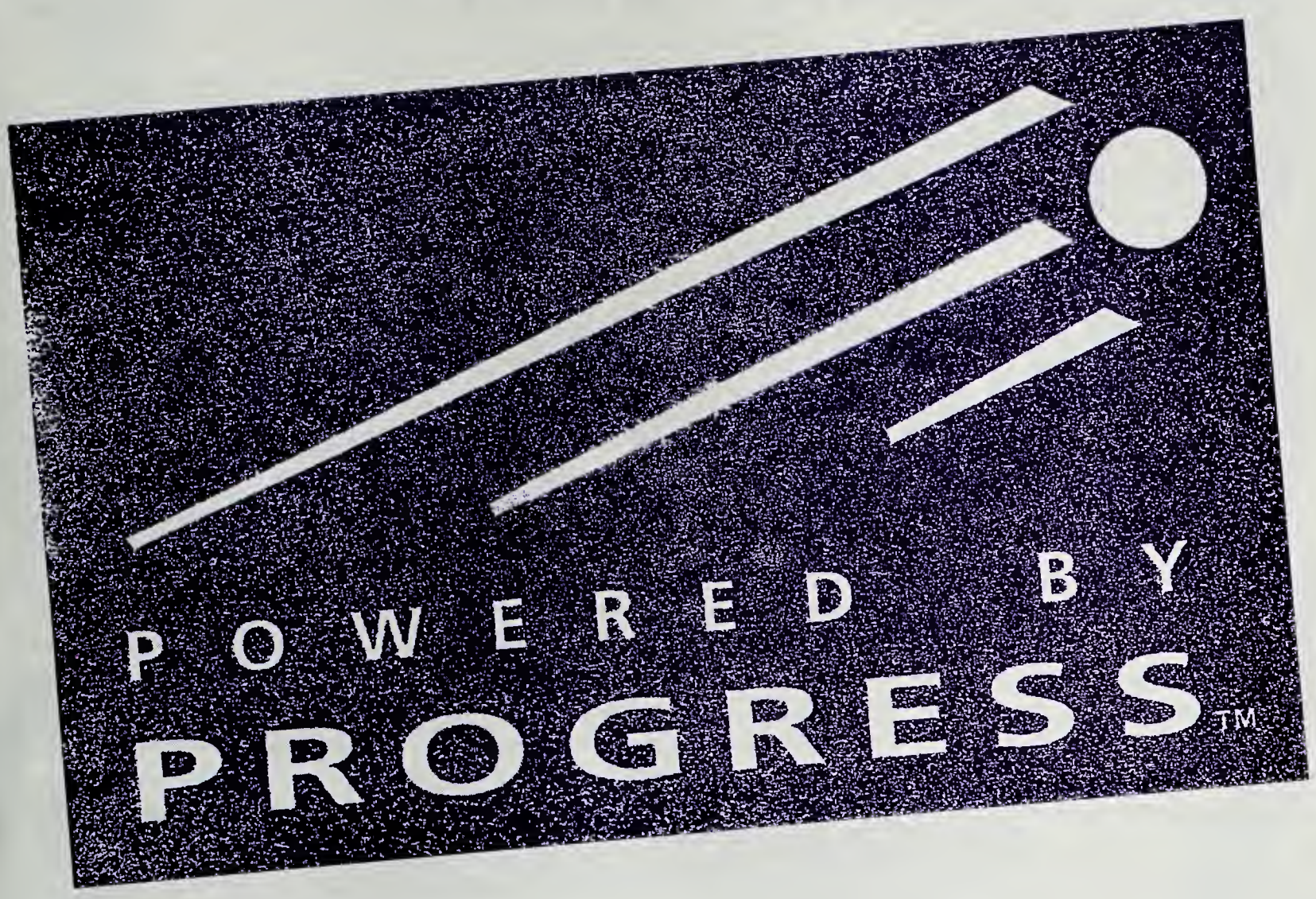
BOB DISTEFANO
Senior vice president of IT, The Vanguard Group, Valley Forge, Pa.

In 1993, Vanguard IT staffers had to work to regain users' confidence when a 50-workstation document management system failed to scale to the 1,000-user level. The rollout slowed while IS tried to reconfigure screens. Some users could access the system for limited work. So DiStefano placed systems teams and users side by side in the user operations buildings. Problems were solved faster, and relations got friendlier.

BOB MORAN
Director of IT, Carrier Corp., Syracuse, N.Y.

Moran suggests companies get up-front management buy-in to a new project to avoid sticker shock. Recently, for example, a Carrier general manager set a two-month deadline for a particular project. "He didn't understand the implications of doing it that quickly," Moran said. So his IT group came back with a detailed plan, resulting in a six-month extension.

WHAT IS THE MARK OF A TRULY POWERFUL ENTERPRISE?



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THE HIGH PRICE OF LABOR AND PRODUCTS DOESN'T GUARANTEE GREATER CONTROL. THAT'S WHERE INNOVATION AND NEW POLICIES COME IN.

Dollars and sense of network management

Ask any network manager what the most expensive part of distributed network management is, and you'll get the same answer: It's the people. Experienced, savvy people.

The fact is, distributed networks are getting more complex every day, and the tools, while always improving, can only go so far. If, for instance, a network monitor detects an unusually high transaction load on a LAN segment, how do you determine the specific cause? Emerging products such as the CoroNet Management System from CoroNet Systems, Inc. in Los Altos, Calif., are starting to answer such questions by bridging the systems/network management gap.

But mostly, "you might have the right people in the right room at the right time, and that's how those correlations are made," said John Shortall, an analyst at the LGS Group, a consultancy in Montreal.

In fact, labor costs account for 42% of the overall price tag of running a network, according to Strategic Networks Consulting, Inc. in Rockland, Mass. And that percent is increasing.

"The labor needed per unit of work is still high," said Randy Smith, project manager at United Parcel Service, Inc. in Mahwah, N.J. What we need is "a fundamental shift" toward building more reliability and manageability into the network equipment itself "to reduce labor by an order of magnitude. But I don't see that happening yet," he said.

Today's situation is like the early days of the telephone, when some predicted everyone in the U.S. would have to become an operator in order to manage the fast-growing (and labor-intensive) phone network, said William Branson, senior network engineer at Frank Russell Co., the world's largest pension fund consultant in Tacoma, Wash. The disparity between network growth and staff demands is so large that "you can't just add people," he said.

Even if you could, it might be hard to find experienced staffers. "It takes months and years to build expertise," said Blair Sanders, senior member of the technical staff at Texas Instruments, Inc. in Plano, Texas. "You can send someone to a router or SNMP class, but when do they understand how all of the various technologies relate to or impact one another?" Plus, he said, "there's a lot of turnover" — as much as 10% to 20% per year.

Clearly, something needs to change. Emerging products are certainly playing a role in reducing grunt work and guesswork in network management (see story page 48). But it's more important for network manag-

Please turn to page 48

CSJ FIRING LINE

SEE PAGE 68 for a comparative review of new network management systems from IBM and Sun Microsystems, Inc.

BY MARY BRANDEL

The cost spiral

Labor is the largest piece of network management actual costs at this large pension-fund consultancy

ANNUAL EXPENDITURES
LABOR
■ The equivalent of 2½ to 3 full-time positions, comprising one senior network engineer, help desk personnel, desktop personnel and operators: $250,000 to $300,000
EQUIPMENT
■ $60,000 (in annual depreciation)
TOTAL
■ $360,000

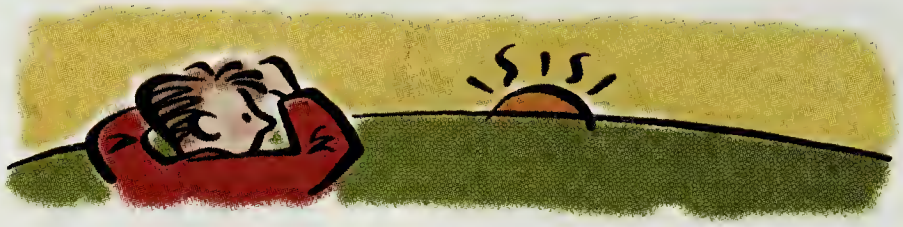
ENVIRONMENT
■ IBM mainframe, SNA network
■ Frame-relay WAN
■ Leased and dial-up lines for data feeds
■ Three RS/6000s running Sybase
■ Two Notes servers
■ Six to seven production file servers supporting a 1,200-node Novell NetWare LAN

NETWORK MANAGEMENT EQUIPMENT
■ Network General's Expert Sniffer
■ Sun's SunNet Manager, moving to IBM's NetView/6000
■ Bay Networks' Optivity for the WAN
■ DeskTalk's TrendSNMP+ for capacity planning
■ Cisco Systems' CiscoWorks

To deflate labor costs — and keep revenue losses to a minimum on increasingly mission-critical networks — many experts are pointing to more network planning

Source: Infonetics Research, Inc., San Jose, Calif.

ILLUSTRATIONS BY KATHRYN ADAMS



Over the Horizon

With IS departments struggling with a static or decreasing head count, vendors are promising all sorts of tools to take over some of the work traditionally done by people. Network General's Expert Sniffer, for example, abstracts the meaning from network protocol streams and suggests responses to the user.

But to fully exploit these capabilities, IS needs a common framework to link the tools into a truly integrated and distributed framework. The most promising vehicles for this are the three leading enterprise management platforms: IBM's SystemView for AIX, Sun Microsystems, Inc.'s Solstice Enterprise Manager and Hewlett-Packard Co.'s OpenView Network Node Manager.

Following is a summary of what the Big 3 are doing to address the personnel costs of network management.

AUTOMATED MANAGEMENT

The platform vendors all promise to offer data repositories in a year or two that incorporate common object definitions based on standards such as the Object Management Group's Common Object Request Broker Architecture. This will make it a lot easier for users to string together automated sequences in which different management applications can be invoked to carry out tasks such as software distribution.

What's here now:

- **Sun's platform includes NetLabs, Inc.'s Dimons 3G object layer service, which lets applications perform functions across predefined object groups.**
- **Both Sun and HP are supporting NetLabs' Nerve Center, which is said to allow users to set up if-then sequences of responses to a given event.**
- **Sun is rolling out templates and building blocks that can create scripts for automated action sequences.**
- **IBM recently announced a framework for developing rules-based responses to network events.**

DISTRIBUTED MANAGEMENT

All three vendors are working on distributed models. Nodes will be able to divide management duties by device or system type, user organization or geographic region and exchange information for cooperating on network problem solving or backing up one another.

Phase 2 of HP's Tornado, due out in the second half of 1996, will include distributed capabilities for HP's Network Node Manager, including the ability for distributed nodes to share data via a synchronized distributed database.

A distributed version of IBM's NetView for AIX, with manager-to-manager communications, is waiting for the Internet Engineering Task Force to finalize Simple Network Management Protocol 2.0's manager-to-manager communications, an IBM spokesman said.

What's here now:

- **HP's OperationsCenter 2.0, scheduled to ship this month, introduces intelligent agents that can reside on individual systems and respond automatically to common problems.**
- **IBM's System Monitor lets users set up remote nodes that collect alerts from a local LAN and send key data up to a central NetView for AIX node. This node can initiate actions on remote nodes without a person at each remote site.**
- **Sun's Solstice now provides the ability for one node to replicate data about its management domain to another node.**

Written by Elisabeth Horwitt, a freelance writer in Waban, Mass.

Continued from page 46

ers themselves to find innovative practices that remove some of the labor and free them up for more proactive network management.

One way of doing this is to delegate more management tasks to a body of less experienced staffers, freeing up a smaller group of higher-level staffers to concentrate on more complex management jobs. Branson and his colleagues are implementing such a strategy, which he referred to as "rezoning."

"We might have 50 people on staff, with 12 to 13 really senior people," Branson said. "If we can spread that knowledge to computer operators and help desk people, we've ... increased staff without increasing staff."

Paving the way to this goal is a growing body of expert-based tools that can gather network events, filter out extraneous data, prioritize and correlate the events and even advise the user on the right response.

Bay Networks, Inc.'s Optivity 6.0, for instance, correlates alarms and summarizes the problem in a pop-up folder rather than presenting help deskers with a network map full of blinking alarms, Branson said.

UPS is taking a similar rezoning tack. It rolled out a system this summer that passes expertise on to its 1,400 field technicians.

The base system uses LANdesk systems management tools from Intel Corp. and Novell, Inc.'s NetWare Management System platform. After a lot of in-house development and integration, the system can take those alerts and alarms and turn them into trouble tickets and work orders, complete with information for problem resolution. Technicians can also access on-line diagnostic aids and reference materials culled from UPS's management experiences.

"It's a shift in focus from hunting through a bunch of unrelated messages and codes to getting hints as to what the problems are," Smith said. A goal of the system is to reduce labor content per hour of availability.

How Are We Doing?

CSJ FAXBACK

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Please take a few minutes to answer the following questions and fax this sheet back to Editor Alan Alper. Thank you.

1. Using a scale of 1 to 5, with 5 being very useful and 1 being not very useful, please rate our coverage of:

- ☐ **A.** Technology trends
- ☐ **B.** Market analysis
- ☐ **C.** Client/server applications in vertical industries such as services, manufacturing, public sector
- ☐ **D.** Product reviews
- ☐ **E.** Product comparisons
- ☐ **F.** Well-known vendor personalities
- ☐ **G.** Vendor strategies
- ☐ **H.** User strategies

2. Please rate the following on a 1 to 5 scale, where 5 is the most important benefit and 1 is the least important benefit you obtain from *Computerworld Client/Server Journal*:

- ☐ **A.** Helps me do my job better
- ☐ **B.** Provides information on technology directions
- ☐ **C.** Helps me stay up to date on what my peers/competitors are doing
- ☐ **D.** Other (fill in)

_____

3. What do you like most about *Computerworld Client/Server Journal*?

_____

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4. How can *Computerworld Client/Server Journal* be improved (one suggestion)?

_____

_____

5. Using a 1 to 5 scale, where 5 is very good and 1 is very poor, please rate the following in this issue:

- ☐ **A.** *Cover Story:* A Look Into The Labs
- ☐ **B.** Dollars And Sense Of Network Management
- ☐ **C.** Which Way, Novell?
- ☐ **D.** Great Expectations . . . Lesser Results
- ☐ **E.** Centralization Strikes Again
- ☐ **F.** *Case Study:* Unifi
- ☐ **G.** *Interview*: Tivoli Systems
- ☐ **H.** *Test Drive*: Quarterdeck's Internet tools
- ☐ **I.** *Firing Line*: IBM's SystemView vs. Sun's Solstice
- ☐ **J.** *Careers*: The Burnout Syndrome
- ☐ **K.** *Quick Takes:* Object-Oriented Mind Meld
- ☐ **L.** Project Periscope
- ☐ **M.** Cover Art

6. (Optional) Please tell us about yourself. This information will be used for reference only. Your views will be kept confidential.

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Title

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COMPUTERWORLD
CLIENT/SERVER
JOURNAL

Tool automation and intelligence are not the only ways to get on top of the labor game: Some network managers are using historical network data to talk with business managers about the actual cost of implementing a new business application on the network. Once priorities are set, managers don't get stuck doing everything for everyone.

Branson collects network usage data using a product called Trend-SNMP+ from DeskTalk Systems in Torrance, Calif. He can then show business managers their traffic levels, compared with the whole network. "It allows them to measure how much IT resources are consumed to see if it's worth it to offer a particular service" to customers, he said.

GOING SHOPPING

Jim Metzler, director of consulting services at Strategic Networks Consulting, calls this "policy-based data networking." Some companies, he said, develop a list of network services, complete with a page or so of descriptions and a price.

"You're saying, 'Here's my shopping list of services, and you can build it into your budget,'" Metzler said. The idea springs from the voice world, where "when you buy a PBX, you expect it to come with network management, and you expect to pay 10 cents for a call," he added.

Such thinking has led David Seipp, manager of network and technical services at Blue Cross/Blue Shield Rocky Mountain Health Care of Colorado, to create a new type of charge-back policy.

Seipp's group will provide standard network services for a base charge and a price book with options. Prices will be based on traffic information collected with various tools, including Network General Corp.'s Sniffer and the Fluke LAN Meter from John Fluke Manufacturing Co. in Everett, Wash.

If, for instance, a department asks to transfer 2G bytes of files once a week, Seipp's group will test the impact on the network, set a price and make necessary changes to maintain service levels.

Seipp has an advantage that other, larger companies don't: Any network-related services — data communications, phone systems, routers, hubs, cabling, PCs, LAN servers and videoconferencing — reside under one roof. This avoids a lot of potential finger-pointing. "I won't ever tolerate one of my PC guys saying, 'It's a network problem, and they're going to have to call the network guys,'" Seipp said.

For corporations such as TI, whose sites are distributed around the world, a totally centralized network management organization is out of the question.

"YOU CAN SEND SOMEONE TO A ROUTER OR SNMP CLASS, BUT WHEN DO THEY UNDERSTAND HOW ALL OF THE VARIOUS TECHNOLOGIES RELATE TO OR IMPACT ONE ANOTHER?"

BLAIR SANDERS
SENIOR MEMBER
OF THE TECHNICAL STAFF
TEXAS INSTRUMENTS, INC.
PLANO, TEXAS

But TI has taken quite a few steps to minimize labor costs, partly by keeping communications flowing. For one, it has formed "cooperative network management teams" at a few of its sites, combining systems and network administrators. "In the past, there's been a wall between them," Sanders said, but where the teams are used, "we get a lot better support ... [and]) they learn to trust each other better."

Second, using Cabletron Systems, Inc.'s Spectrum management platform, regional sites are able to share and correlate network data. "A distributed SNMP environment is really the key," Sanders said. A regional manager can view multiple management systems in his domain, and a central, worldwide command center can view any location in the environment.

Sanders' group has also been able to eliminate close to one-third of the time spent troubleshooting the network through the use of remote monitoring (Rmon), which enables his staff to do protocol analysis remotely. Plus, he can collect the Rmon data to continuously measure the network's health.

This type of planning is essential to good network management, analysts said. In fact, the ultimate hope is that better designed networks will lead to huge reductions in management labor.

The tools to help with such design — modeling, simulation and design tools from the likes of Make Systems, Inc. and Optimal Networks Corp. — are starting to mature, according to Jennifer Pigg, director of data communications at The Yankee Group, a consultancy in Boston. Right now, though, it takes a fairly experienced staffer to use many of these tools.

Which brings us back to the catch-up game that users and vendors are playing in network management: Network complexity is outpacing the capability of tools and staffs to manage it effectively.

As a result, network managers can no longer try to be all things to all people.

"People have to look at what's most important to them. Is it high availability, quick response time, improving cost per transaction?" said Shahla Butler, associate director at the American Management Systems Center for Advanced Technologies in New York. Butler added, "Depending on the answer, focus on understanding the tools available that address that area." ◩

A Call To Arms

The new client/server application had all the elements for success: a business case with enough savings to impact earnings per share, CEO visibility, slick user interfaces and speedy performance.

It failed miserably. Why? Developers designed the application at corporate headquarters and failed to consider where the users reside.

In this instance, users were at manufacturing plants in rural areas, at the distant ends of a legacy SNA network and several hops across low-speed lines and remote front-end processors. Facing response times of 10 seconds or more, users simply refused to use the application, defaulting to business as usual.

Enter the network manager. No one, including the chief information officer, is better positioned to understand the implications of new client/server initiatives for legacy environments.

Network managers see not just the emerging applications but also the technical implications of client/server: traffic characteristics, protocol suites and failure modes. In effect, network managers own the high ground in the battle between legacy and open systems computing.

In order to take full advantage of their positioning, however, network managers need to break out of their traditional reactive shells and aggressively identify and understand network-oriented applications in the planning stages. And they can't just rely on the CIO to learn about the business issues involved. Direct business contacts can offer an early perspective on emerging applications that may have an impact on the network infrastructure.

I can recall a number of recent client/server applications where the network manager could have prevented system downtime. Consider the following scenario.

NETWORK MANAGERS CAN BREAK OUT OF THEIR TRADITIONAL ROLE TO PLAY AN ACTIVE PART IN HELPING CLIENT/SERVER PROJECTS SUCCEED

One company I know designed a client/server application that downloaded large file updates to LAN-based servers. Occasionally, mainframe downtime during the batch processing cycle forced downloads to occur during working hours, degrading network performance.

The network manager should have helped shape the application's characteristics while it was being designed, not afterward. And he should have been aware of the data center's operational routine, especially the increased user demand on platforms not scheduled for upgrading until the next year.

Another business organization recently linked spreadsheets over a LAN to speed delivery and coordination of financial information. The strategy worked well — until a financial administrator divided by zero and flooded the network with incalculable calculations, crashing applications.

To avoid this unpleasant surprise, the network manager should have sought out key users up front to learn what activities might affect the network infrastructure.

I've heard of another application whose goal was to enable financial services customers to access account information from their PCs. But it ignored the possibility that customers might run the application on laptops with switched cellular modems, thus sending personal identification numbers and personal financial data over cellular channels in the clear.

As in this particular case, an application that was originally designed for desktop use may well become mobile upon rollout for certain types of users, thereby posing security, addressing, bandwidth, updating and other challenges that a proactive network manager could have helped to identify and solve long before rollout.

Network managers who can identify these and other networking pitfalls before they reach production will prove their value as the migration to client/server accelerates.

Lawrence J. Bolick is vice president of network services at Cambridge Technology Partners, Inc. in Cambridge, Mass.

ILLUSTRATION BY KATHRYN ADAMS

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UNDER FRANK MOSS' TUTELAGE, TIVOLI TOOK AN EARLY LEAD IN CLIENT/SERVER SYSTEMS MANAGEMENT. BUT CAN THE COMPANY STAY ON TARGET?

Aiming high, shooting low

INTERVIEW

Frank Moss

CEO, Tivoli Systems, Inc.

HEADQUARTERS
Austin, Texas

1995 REVENUE
*$40 million**

NUMBER OF EMPLOYEES
241 worldwide

CUSTOMERS
Over 300

**Estimated for year ending Dec. 31, 1995, based on Q1 revenue of $10 million*

Distributed systems management is client/server computing's Holy Grail. The quest has confounded industry heavyweights and start-ups alike. Undaunted, 6-year-old Tivoli Systems is vigorously pushing the technology to the limit. It built the industry's first object-oriented, distributed systems management framework. Over time, it layered applications and services on that framework that handle software distribution, configuration management and systems monitoring across heterogeneous environments.

Chief Executive Officer Frank Moss joined Tivoli in 1991, after stints at Lotus Development Corp., Apollo Computer and IBM. Under his stewardship, Tivoli's framework has become a force to be reckoned with in distributed systems management. The numbers tell all: Tivoli is on a run rate of $40 million this year, compared with fiscal 1994 revenue of $27 million. Earlier this year, Tivoli raised $34.5 million in an oversubscribed initial public offering whose first-day price closed at more than twice the opening level. But time will tell more. Tivoli faces stiff competition from players such as Computer Associates International, Inc., whose pending acquisition of rival Legent Corp. creates a potent combination. That plus the inevitable fusing of network and systems management pose serious challenges.

BY ALAN ALPER

CSJ How was Tivoli able to foresee the pressing need for heterogeneous client/server systems management well before many in the industry?

MOSS In the late 1980s, [companies] were deploying Unix applications in what you might today call client/server. [Because there were few systems management tools available], there was a need for having Unix wizards who would train others. In fact, the name of our original product was Wizardware, the idea being you could build off-the-shelf software that would replace the need for having this multitude of wizards.

CSJ Tivoli was anointed the Open Software Foundation's (OSF) systems management supplier. Has the demise of the Distributed Management Environment (DME) had any impact?

MOSS [DME] educated the market [with] very few marketing dollars spent on our part. We received $10 million and $15 million worth of funding [from the OSF and Unix International] to develop [our] framework. That can be viewed as venture capital without equity dilution.

CSJ How is CA's proposed acquisition of Legent going to alter the market?

MOSS The old model of acquisitions or alliances and partnerships work well in the mainframe [world]. But the right solution for distributed client/server systems management needs to be built from the bottom up.

CSJ What about CA's Unicenter blending with HP's OpenView?

MOSS Unicenter for OpenView is fundamentally an integration between the SNMP OpenView network management platform and Unicenter. That's a base capability Tivoli offers. We integrate SNMP alerts from OpenView and other network management platforms through our Enterprise Console. That's an absolute requirement. We don't believe a proprietary connection with a given network management platform is a prudent move.

CSJ You've been criticized for not being on top of the desktop side of client/server.

MOSS We've been shipping TME [Tivoli Management Environment] for NetWare, NT, Windows, DOS and OS/2 for over a year now. I think folks would like to think we're focused primarily on Unix [servers].

We're going to be integrating [Desktop Management Interface] with the Object Management Group-based technology that Tivoli provides in the framework. We're going to look for ways to extend the basic framework technology down to the desktop in what you might call a lightweight framework and then begin to move the applications into the desktop environment as appropriate.

CSJ Does your recently announced Application Management Specification (AMS) play into this?

MOSS There's a tremendous gap today between application development and manage-

Please turn to next page

Frank Moss: 'Going public is just the beginning.... If I were to start fresh today, this is the space I'd want to be in.'

PHOTOGRAPHY BY WILL VAN OVERBEEK

Continued from page 53
ment and deployment. And in order to meet that need, we've created AMS. We are openly publishing this spec, [which] captures what interfaces need to be implemented by an application in order to fit smoothly with TME. So the customer can move immediately from application development into management without that middle step.

CSJ Do you have any plan to integrate with Microsoft's BackOffice?

MOSS We will be able to integrate with [Systems Management Server]. BackOffice [which includes SQL Server 6.0] is a very interesting environment, but compared with databases or Notes, the management opportunity is only a fraction of [those markets]. We [will] manage NT as a server and a client. The near-term opportunity that we see is to provide integrated NT/Unix management under a single console.

CSJ Do you have any plans for MVS-class mainframes?

MOSS It's important to be able to take events or alerts from the mainframe and bring that into a centralized console. Our Enterprise Console is our integration point between mainframe events and distributed management events. We're working with customers to build custom adapters and with third-party vendors who will build Tivoli Enterprise Console adapters for MVS for various subsystems.

CSJ I noticed in your prospectus that had you not received porting revenue, the company would not have been profitable for the last four periods [through year-end 1994].

MOSS We were profitable in the first quarter [of 1995]. Our expectations at the IPO time frame were to post profits as good as best-of-breed client/server applications vendors, which is 20%. The engine of growth is our end-user sales. Revenue from end-user licenses in first-quarter '95 showed 207% growth over first-quarter '94. Porting is tailing off rather than increasing.

APPLICATIONS THAT TAP INTO INTERNET SERVICES "MAY SEEM FLAKY TO IS MANAGERS TODAY, BUT MANAGING THOSE APPLICATIONS . . . WILL BE THE ULTIMATE CHALLENGE OF THE LATE 1990S."

CSJ What happens to Tivoli when the framework becomes a commodity?

MOSS The value of the framework is not in terms of its revenue to Tivoli but in terms of the market presence it gives us. If you look at our end-user sales, there's a nominal charge for the framework. Tivoli will make its money off of applications and services that run on the framework.

CSJ Are acquisitions part of your growth plan?

MOSS I do not see the acquisition model as the wave of the future. I see Tivoli as an enabler who can cause new and creative products to come to market.

CSJ What do you see as the biggest unresolved issues in client/server systems management?

MOSS The biggest issue is to complete the link between applications and systems management. Organizations that build or implement packaged applications face the prodigious task of making them fit into management systems.

The second biggest problem is controlling the client on the desktop or in remote computing when coupled with an enterprise application. We have Tivoli and HP and IBM network management for the enterprise and [a host of] LAN management tools. Managing desktops and servers from a central site in a synchronized and consistent way is imperative.

The third relates to interenterprise management. One is the outsourcing model, in which systems integrators reach into the networks of their clients to help them manage their resources from a central site. The second is managing network services, such as network Notes, providing a consistent set of services connecting with subscriber nets.

Ultimately, this model means managing Internet-based applications. Some very sexy tools are now emerging like [Sun's] Hot Java, which allows you to build applications that tap into Internet services. That may seem flaky to the IS manager today, but managing those applications and services as they connect to the Internet will be the ultimate challenge in the late 1990s.

CSJ I heard that after working four years of 70-hour-plus weeks, you're going to cash out?

MOSS There's no element of truth to my retirement. Going public is just the beginning. We're going to expand globally, in Europe and Japan. The next five years [will] be more exciting than the last five. If I were to start fresh today, this is the space I'd want to be in, and Tivoli would be the company I would play with. ◩

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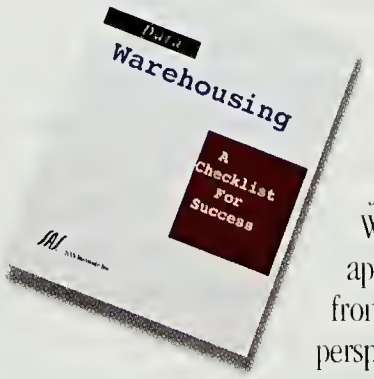

Building a successful data warehouse requires careful planning. Luckily, information managers everywhere can have the facts at their fingertips with SAS Institute's *Checklist for Data Warehousing Success*. We've included practical tips for approaching data warehousing from corporate, business, and IT perspectives.

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COVERING YOUR ASSETS

FOR INSURERS, SURVIVAL DEPENDS ON MINING DATA TO DISCOVER TRENDS AND CONSOLIDATING SYSTEMS TO CREATE EFFICIENCY

An old adage says if a dog bites you once, it's the dog's fault. But if it bites you again, it's your fault. Provident Life & Accident Co. in Chattanooga, Tenn., is not about to get bitten again.

Like most health insurers, Provident began selling a new type of disability insurance in the early 1980s: noncancelable policies that guaranteed a salary to self-employed workers who became disabled and could no longer perform their duties.

Certain occupations, unfortunately, turned the policy to their advantage. Surgeons, for instance, could claim they were unable to operate (for nervous or other reasons) but could then accept teaching jobs and collect two salaries.

Disability quickly became one of the most expensive pieces of these health insurers' business. "Not a single disability insurer is having a good year, based on the insurance sold in the '80s," said Pat Berastegui-Egen, director of data access at Provident. "We realized that we have to get a handle on these types of patterns."

But how can you spot trends when you're buried in paper, as insurers infamously are? Even if you could query the legacy systems in place at many firms, the information is likely stored in stovepipe fashion, not by claim type or customer.

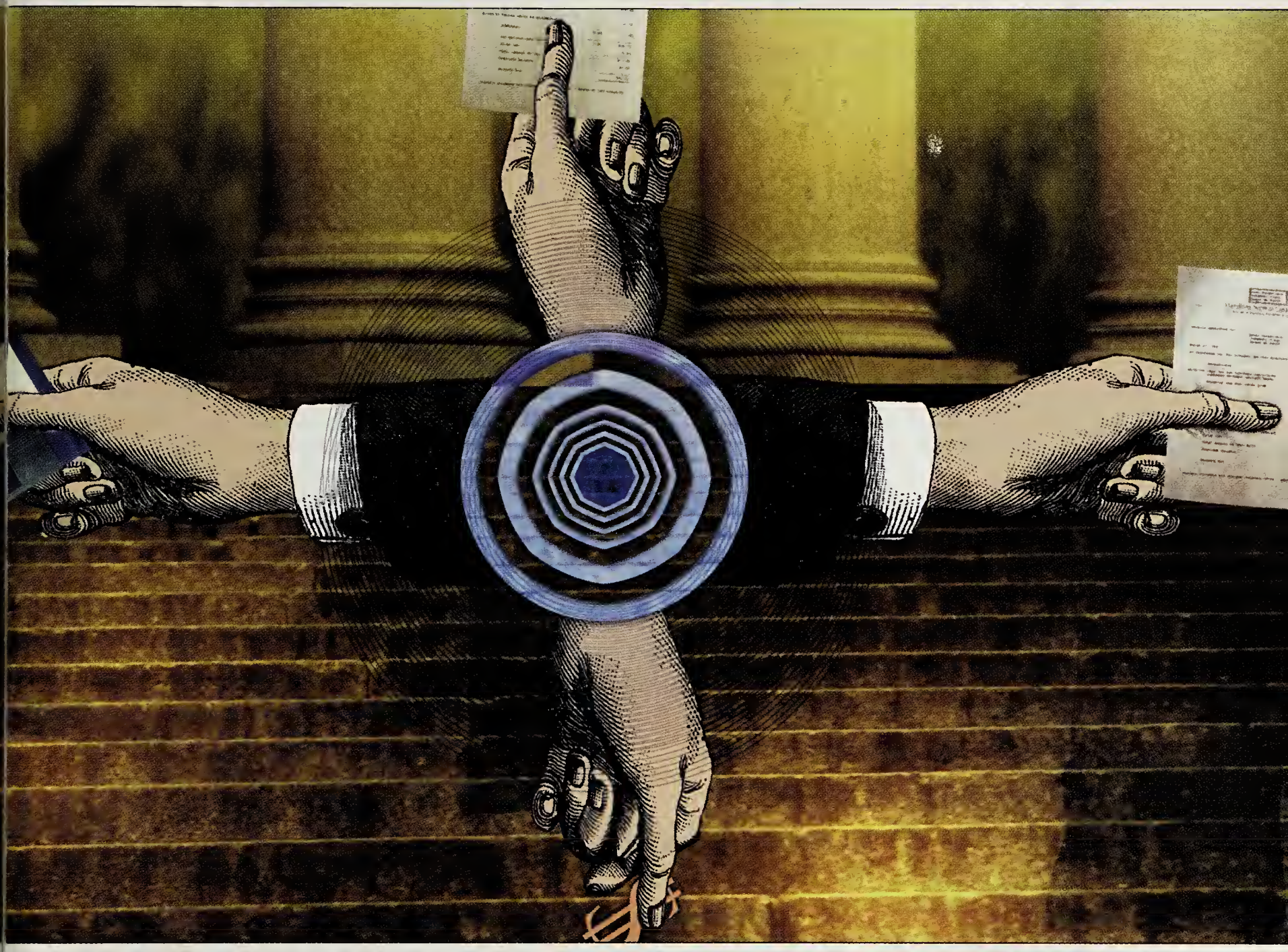
That's why Provident is among a growing number of insurers that are designing data warehouse systems that will answer questions such as, "Show me all claims over $1 million or all claims by state."

"If we see unusual activity, we can focus on it early before it's too late," Berastegui-Egen said.

Insurers are also considering warehouses for marketing reasons. "You might want to look at the whole product life cycle — what do you need when you're 22, 32, 42, 52?" said Joe Correira, vice president of applied technology at Travelers Insurance Co. in Hartford, Conn.

At Provident, the warehouse will start out small, targeting only disability. For simplicity's sake, the first itera-

BY MARY BRANDEL AND GARRETT DEYOUNG



tion may run on the mainframe. But the company plans to eventually include all customer and claims information at the $3.2 billion firm in several distributed (likely Unix-based) warehouses, including both the "individual" and "group" (employee benefits) sides of the business.

In general, insurers are just now embarking on such distributed computing technology. "The industry has traditionally not been quick to adopt new ways," said David Flaxman, a partner at KPMG Peat Marwick in Radnor, Pa. "Now it's starting to wake up."

"We're [realizing] we've got to . . . study the dynamics of the demographics — basically, try to understand the market a little better," said Roger Thibodeau, assistant vice president of client/server engineering at Connecticut Mutual Life Insurance Co. in Hartford.

And with good reason. Insurers today are undergoing the same level of upheaval and consolidation that banking and other industries have seen for the past several years. All areas of insurance are being driven to find new, more profitable business methods:

- While health care insurers have thus far escaped threatened reform measures, the managed-care concept is compelling them to beef up enrollments (in some cases, via mergers) to negotiate lower costs from providers.
- Mainstream life insurance companies are fighting off a stagnant market and innovative new competitors — retailers and lenders, for instance — as well as changing consumer attitudes. "Many workers now ask, 'Do I really need life insurance?' " Berastegui-Egen said.
- Casualty and property specialists have paid out hefty sums after several natural disasters last year, including the California earthquake.

As a result, many insurers today are rationalizing their bread-and-butter systems, which tend to be built in stovepipe fashion, said Barbara Smiley, an analyst at The Tower Group, a Boston-based consultancy.

"We're trying to break down the barriers that exist

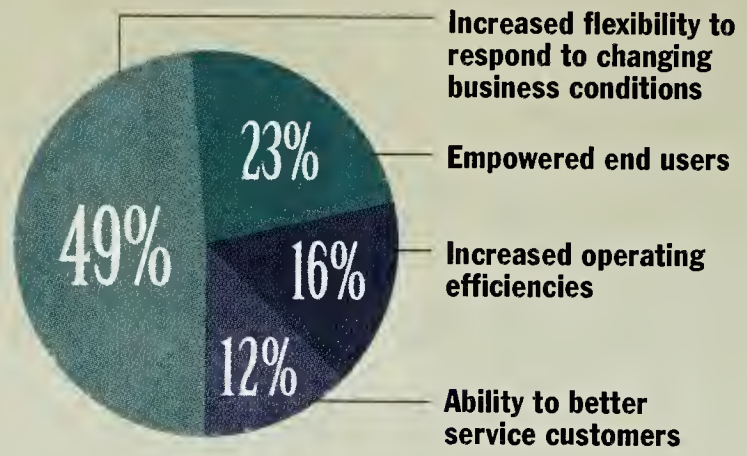
Please turn to next page

ILLUSTRATION BY MARK YANKUS

SURVIVAL, FOR A PRICE

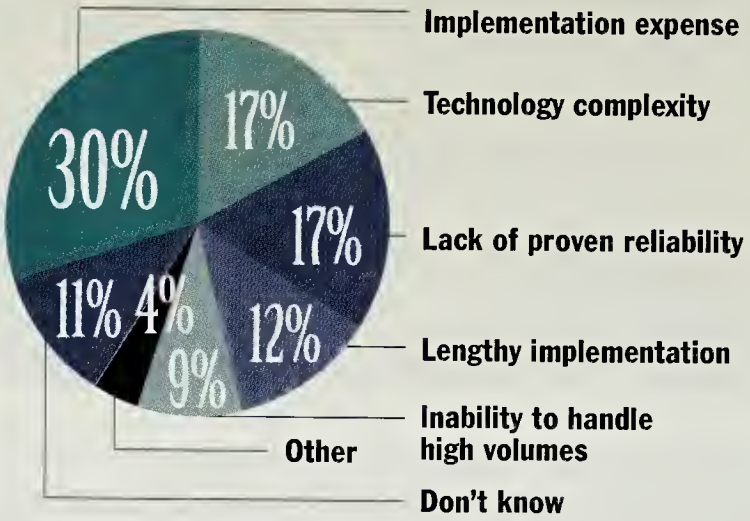
For most respondents, flexibility is the driving force behind a move to client/server . . .

REASONS FOR MOVING TO CLIENT/SERVER



. . . and cost the greatest barrier

BARRIERS TO MOVING TO CLIENT/SERVER



Base: 100-plus non-SQL Financials customers in the insurance sector

Source: SQL Financials, Inc., Atlanta

Continued from page 57

between lines of business," said Jim Koch, assistant vice president for the employee benefits systems at Provident. Three and a half years ago, Koch's team migrated the group disability portion of the employee benefits business to an all-IBM client/server system, dubbed Polaris. Polaris users originate proposals, bill clients, pay claims, collect premiums and do statistical analysis with DB2/2 and DB2/6000 databases on OS/2 and RS/6000 servers.

The intent at the time was to reduce mainframe charges, provide more end-user functionality and integrate business functions.

But the new charter is to move all employee benefits products to Polaris by the end of 1996, including long- and short-term disability, life and accident/sickness. The plan this time is to integrate the employee benefits business and thus provide better customer service.

Multiple marketing or billing systems may be consolidated into one. If a corporate client has four or five policies, "they could get billed through one system, and one premium check would come in," Koch said.

That consolidated view may also be important to Connecticut Mutual if its proposed merger with Massachusetts Mutual Life Insurance Co. in Springfield, Mass., is approved. The feasibility study will be presented to the board of directors next month.

"You want to appear to the customer as one company," Thibodeau said. But rather than merge systems, which operate under different business and accounting rules, he said, it would be easier — at least initially — to create a data warehouse to combine and present that data.

Elsewhere in Hartford, ITT Hartford is breaking down its old departmental barriers with a partially rolled out three-tier client/server system in 40 regional offices. The system is intended to obliterate the former assembly-line-style operations and support a new cross-functional approach (see "Teamwork, With a Capital ITT" in the CSJ June 1995 special issue).

Before, sales, underwriting and risk assessment were all separate departments. Now, they are combined into regional teams that work from a common set of applications to support independent insurance agents. The regional offices use Oracle Corp. servers, which depend in part on updates from a home-office Oracle server.

ITT expects to save $30 million to $40 million annually, primarily through reduced labor costs, slower employee turnover and improved service. Perhaps more important, however, it expects to cut product delivery times by a whopping 80%. Surrounded by several of the nation's biggest and most aggressive insurers, the company is "being driven by new products and faster time to market," said Raymond Howell, assistant vice president.

As insurers work to establish these new, more functional systems, they also need to keep an eye on the cutting edge, which will almost certainly include tight electronic links with customers and business partners.

Already, insurers such as Massachusetts Mutual post basic product and services information on the Internet, although, "so far, it's hard to find companies that are doing things in a serious way now," Smiley said. "They're mostly putting their face on the Web to see what happens."

But it's coming. "More and more corporate customers are saying they want [reports and other information] sent through EDI or messaging," Berastegui-Egen said.

Agents and brokers on the consumer side, as well as consumers themselves, are also joining the throng. Provident currently handles those requests in ad hoc fashion through America Online or value-added networks, "but we need to come up with an overall way," she said. ◩

Brandel is senior editor at Computerworld Client/Server Journal. *DeYoung is a freelance writer in Scituate, Mass.*

HEALTHY TECHNOLOGY

Blue Cross/Blue Shield of Massachusetts clearly sees client/server technology as a way to retain its reputation as a medical insurance powerhouse. The health care provider has increased its IS budget by 15% over last year's level and is investing heavily in young venture-backed firms to gain access to new technologies. Its primary targets: customer service and new business development, said Dr. Russell J. Ricci, president of Blue Cross/Blue Shield's New Health Ventures unit.

Case in point: This spring, the company announced a home page on the World Wide Web that offers updates on health issues and a shopping list of products and programs. Over the next six months, the Web site will also post insurance information for new clients. Instead of looking through a 3-in.-thick document, new clients can do keyword searches, said Mary Mikelk, manager of consumer technology at Blue Cross/Blue Shield.

"Besides price differentiation, it's coming down to services rendered," Mikelk said, referring to health care competition.

The company has also installed four touch-screen multimedia kiosks in Eastern Massachusetts that are connected to Blue Cross/Blue Shield corporate mainframes and an IBM PC server back at headquarters. Members can use magnetic stripe cards to access their coverage profiles on the mainframe.

Dr. Russell J. Ricci: Blue Cross/Blue Shield of Massachusetts is using technology to target customer service

Members and nonmembers can use the kiosks to obtain data on medication. That information, plus member-physician phone numbers, is updated by the PC server. The kiosks notify the server if they run out of paper or have technology problems.

The server, in turn, extracts usage trends. "We can tell what people are using it for and for what duration," Mikelk said. There is a limit, however, to how much user information the company can collect. "It becomes a privacy thing," Mikelk said.

PHOTOGRAPHY BY SETH RESNICK

The Object-Oriented Mind Meld

BY ELIZABETH HEICHLER

Users in Norfolk Southern Corp.'s transportation department have learned they can't just throw specs over the wall to the information systems group if they want systems that fit hand-in-glove with their business needs. That's why some staffers are working closely with developers to build business objects for a new train tracking system under construction.

But Norfolk Southern also discovered that it takes training, the right tools and plenty of time to get the two groups on the same wavelength. The same is true for any company where business modeling and object-oriented methods are blurring the lines between IS and end users.

For example, Norfolk Southern's transportation unit somewhat reluctantly committed three full-time people to work with IS on data modeling. The process took 1 to 1½ man-years, said Brad Fitzgerald, a transportation department system manager at the railway's Atlanta office.

Even heavier end-user resources were called for in the next stage: the design of use-cases, a technique invented by object method maven Ivar Jacobsen to describe how a computerized process works from the user perspective. Users worked with developers on detailed descriptions of business processes, from which developers then built business objects and methods.

"With use-cases, you're looking at three to five man-years, and that we weren't ready to do," Fitzgerald said. "But as we got into it, we decided it was the best thing, and we shifted manpower to do it."

It takes training, time and a shift in manpower to pair users and developers

Seeing a market opportunity, other vendors are releasing tools to engender more harmonious business object modeling. ParcPlace Systems, Inc.'s MethodWorks, for example, requires developers and users to sit together during a highly iterative modeling process. While users do not build objects, their input is needed to ensure that objects match the realities of corporate processes, according to the Palo Alto, Calif., firm.

But not everyone needs such high-tech aids. "We got on pretty well with marker boards. The fact that we used no technology made it nonthreatening," said Gerald Callistein, office automation analyst at Mobil Corp. in Fairfax, Va.

Tom Hadfield, manager for new payroll systems at Chrysler Corp. in Centerline, Mich., still thinks the best tool available is a special whiteboard that produces printouts of whatever has been written on it.

What's bringing end users and IS staffers together is not necessarily the technology; it's the object-oriented method of systems design, which enables developers to use English words for processes and objects when sketching out an application design. "When you speak in object terms, you are using terms both you and the client understand, rather than talking about data structures and program flows," Callistein said.

But all this is moot without proper end-user training. Else-Marie Ostling, vice president of professional services at Objectory, a Stamford, Conn., maker of methodology tools, recommended that clients send some users through the same high-level business modeling training their IS people go through. After all, an educated user will make the best contributions to the process. ◩

Heichler is Computerworld*'s senior editor, Application Development.*

ILLUSTRATION BY JOHN NELSON

Great heights are seldom reached alone

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CASE STUDY UNIFI, INC.

Choosing the Fabric

Its pattern complete, Unifi knits together its global client/server network

PART 3

When we last left Unifi, Inc. [CSJ, April 1995], the $1.5 billion textile fiber manufacturer had finished its business process re-engineering blueprint, reducing operations to 31 major processes, and had installed an office automation environment that was built around Microsoft Corp.'s Office. The Greensboro, N.C., company has made its enterprise, client/server infrastructure choices and has entered into final negotiations with selected vendors.

Switching into client/server's fast lane requires careful checking of side and rearview mirrors while simultaneously looking ahead to avoid pileups. Proceed only when all's clear.

That's the drill Unifi recently went through. Three months of analyzing and dissecting seven vendor proposals resulted in a clear and open path. The decision: to go with tried and true vendors, the ones that had most aggressively courted Unifi and that offered the most flexible approaches to meeting its business needs.

The selections? Unifi chose Oracle Corp. for its application development tools, databases and core business applications and IBM for its RS/6000 servers, AIX operating system, systems management and consulting services. (The company is currently installing a TCP/IP Ethernet wide-area network that links dispersed operations over T1 and 56K bit/sec. lines.)

Contracts were expected to be concluded by press time. Implementation is slated to begin early this month. "We anticipate that seven or eight [Oracle Financials] modules will be in place by the first quarter of next year," said Ralph Mayes, Unifi's chief information officer.

CIO Ralph Mayes expects to rely heavily on IBM and Oracle — key players in Unifi's client/server transition

Both IBM and Oracle will play critical roles in the three-year, $10 million project that commenced last fall. Mayes said their technologies will help transform Unifi's single-product, single-plant operation into a highly integrated global enterprise where knowledge workers anywhere on the network can access and exchange business-critical data.

The decision to negotiate with IBM was shocking even to Mayes, given IBM's mainframe heritage. But the vendor pulled out all the stops: Its process and textile business unit coordinated various IBM units, including Integrated Systems Solutions Corp. In addition, it included equipment maintenance and assistance with tying the applications environment to the network. IBM's international presence also jibes with Unifi's global objectives.

"I grew up with IBM early in my career, but I've never seen them as aggressive, alert and partner-oriented," Mayes explained. "They've been aggressive on every front, com-

BY ALAN ALPER

PHOTOGRAPHY BY WILL MCINTYRE

Nips and Tucks

Technology selection will no doubt be a key milestone in Unifi's client/server transformation. But none of distributed computing's business benefits can be deliv- ered until the firm rebuilds its information systems organization to accommodate change across the enterprise.

That process is well under way. "To make this work, you need to consider the current organization's mix of skills and experience and how you infuse new skills — not just technical ones but business appreciation," explained Ralph Mayes, CIO at Unifi.

Since the project began last fall, the company has restructured its 75-person IS staff.

Unifi has already hired more than 40 staffers with skills ranging from application development and project management to technical support.

"As it became clear that we were going with Oracle, we hired more people with Oracle applications experience, but we're also hiring people with multivendor and multiplatform backgrounds," Mayes said.

Approximately 30 operations support people have been dispatched directly to the business organization for which they work. The reason: Many of the information technology functions they provide, such as AS/400 data entry and management, are inextricably connected to the transportation and distribution operations at their specific manufacturing clusters.

"They're really misplaced [IS] functions. We wanted them to be user-owned, where there would be more latitude on how the [staffers] would be used," Mayes said. "We still manage corporate [IS] policy and procedure."

Existing staffers and new hires are selected and trained to follow three distinct career paths: systems consultant, for those who understand business/technology linkage and can build solutions; systems engineer, for the technical gurus, some of whom have engineering degrees or engineering backgrounds; and systems services, for those who will handle PC support, help desk and facilities support.

Technology change isn't the only thing creating the staffing and training needs. There's also Mayes' desire to increase the IS contribution to Unifi's overall growth and global expansion.

"We're making the investment in people because IS has to be more innovative and involved in change management and productivity enhancement because we're entering a more competitive global economy," he said.

bining product and services with aggressive pricing [and] leveraging [their historic] strengths."

IBM seems well positioned to help Unifi transition from its disconnected AS/400 setup to a multiplatform environment, with PCs and Unix workstations accessing data and applications from Unix servers over the TCP/IP WAN.

"We think the RS/6000 is essentially caught up and is now technology-leading. IBM also seemed more up to date with systems management" than other bidders, including Hewlett-Packard Co., Mayes said.

Oracle, too, left no stone unturned to win Unifi's approval: It brought in its No. 2 executive, President of Worldwide Operations Ray Lane, to seal the deal. "They see this as a way to enhance their product line and use us to understand their product extension needs," Mayes said.

Mayes' team evaluated products from all the major applications providers (SAP America, Inc., Baan Co., etc.), but it soon realized they all had gaps and required partnerships with third parties. What made Oracle the obvious choice? "We think they have the best vision of a totally integrated information environment, beyond core business applications," he said.

Oracle's recently unveiled Smart Client also provided the best view of information from the desktop, he added. Oracle Financials also excelled in ease of use, portability from one environment to another and seamlessness among applications.

Given the leapfrogging game the application vendors play, Mayes said he realized that vision should prevail over specific functionality.

There were some disappointments. All the major vendors are still struggling with the optimal way to configure remote clients in a decentralized, distributed computing environment. This is a major concern for Unifi because it intends to provide corporate data access to its European division, overseas business partners and its own road warriors. "How do you manage data?" Mayes asked. "On the applications side, it's a tradeoff between performance and reliability and a high degree of data integration. All vendors are still evolving strategies to do that well."

Only time will tell if Unifi and its partners can overcome this obstacle and any others that pop up over the next two years. ◩

Unifi is a 24-year-old maker of texture polyester and nylon yarns; natural and packaged dyed, spun yarns; covered elastometric yarns; and twisted yarns. The 6,500-employee firm exports to more than 30 countries from 28 domestic plants and to more than 20 European countries from its division in Ireland.

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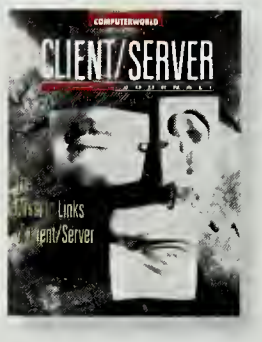

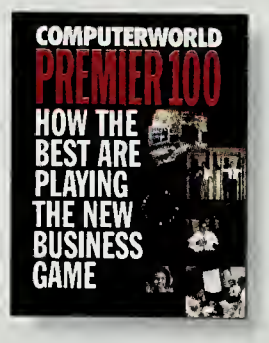

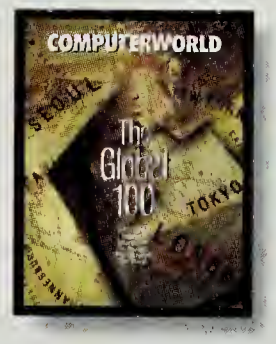

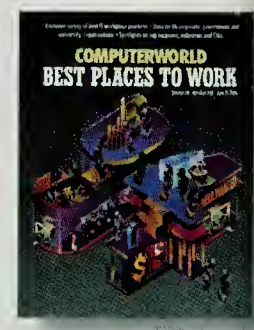

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The Burnout Syndrome

Monetary rewards, job recognition, job-changing can all combat distributed computing stress

It's the fastest-spreading disease in the client/server world. Burnout.

The symptoms are extremely difficult to detect: A nasty word here. A sullen look there. A shorter fuse that blows a little more frequently. A barely noticeable decrease in efficiency and effectiveness.

The trouble is, employees rarely come right out and admit to feeling these symptoms. "No one has literally come to me and said that they can't do as much as we're asking them to," said Ray Howell, assistant vice president at ITT Hartford in Hartford, Conn.

And his staffers are asked to do a lot: In addition to their regular duties, they're also helping 40 regional offices implement the company's new client/server configuration.

To achieve its goal of finishing the groupware component by first-quarter 1996, the company's four- to five-person client/server SWAT teams totally reconfigure one office and upgrade two others every month. Every team covers one trip per month. After working all weekend, they're expected to be raring to go on Monday morning.

"They've been thrust into a travel routine that's turned their lives upside down. They're being stretched too far," Howell said.

To alleviate the burden, Howell said he's looking into remote systems management software. He has also added personnel to the platform support team, has reduced the frequency of trips and is investigating outsourcing opportunities. But so far he has discovered it would cost three times as much as keeping the function in-house.

The burnout virus doesn't discriminate by company size. It has even infiltrated Furman Foods, a 250-employee tomato products canning company in Northumberland, Pa.

An employee there who is overseeing the company's client/server implementation is starting to come apart at the seams, said William Furman, director of information systems. That employee is responsible for the sales and marketing organizations and the daily sales functions.

She is burdened with 60-hour work weeks and trying to answer to three different business units. Part of the cure, Furman said, would be for her boss — the chief executive officer — to become more aware of the project and its obstacles. "The CEO is very conscientious, but he hasn't become personally involved enough in the project," Furman said.

Top-brass involvement is what helped Memphis-based FedEx Corp. through some tough times. In the early days, "we never knew what would go wrong," said Miley Ainsworth, director of IS.

At one point, for example, one project was delayed interminably by a piece of data that seemed to hang in the system forever, Ainsworth said. The ensuing rebooting process took 30 minutes.

"One guy left because it was so tough to get used to," he continued. "He was fairly new to the company. But most of our implementation teams had worked with each other for as many as eight years. And although we did have some turnover, there was a lot of camaraderie."

That team spirit reached to the top of the FedEx management pyramid. Executives instituted monetary rewards for outstanding performance and created job recognition categories.

In addition, Ainsworth conducted one-on-one sessions with employees who appeared stressed and tried not to keep one person too long on a deadline project.

"If anyone stays with one job or one project too long, they'll burn out," he said. "You've got to give them space. Don't baby them — just make sure you value them." ◩

Written by Willie Schatz, a freelance writer based in Washington.

ILLUSTRATION BY DAVID CLARK

Training gain

IN COMPANIES SURVEYED, THE PERCENT OF STAFFERS KNOWLEDGEABLE ABOUT PCs AND CLIENT/SERVER INCREASED AFTER THE FIRST CLIENT/SERVER IMPLEMENTATION . . .

	BEFORE	AFTER
PC computing	51%	66%
Client/server	24%	44%

. . . BUT THERE WAS NO DROP-OFF IN HOST-BASED KNOWLEDGE.

(percent of staff)	BEFORE	AFTER
Traditional host-based computing	74%	73%

AVERAGE STAFF SIZES TENDED TO INCREASE AFTER THE ARRIVAL OF CLIENT/SERVER

	BEFORE	AFTER
Average number of IS staffers	437	501

Base: 112

ALTHOUGH A GOOD PORTION OF RESPONDENTS HIRED NEW STAFFERS TO FILL THEIR CLIENT/SERVER NEEDS . . .

Hired new staffers	39%
Didn't hire new staffers	59%

. . . MOST TRAINED CURRENT STAFFERS.

Provided training	80%
Did not provide training	19%
Don't know	1%

HOWEVER, LESS THAN HALF UNDERWENT TRAINING, AND JUST ABOUT HALF ARE WORKING ON CLIENT/SERVER PROJECTS TODAY

Underwent training	44%
Working on client/server projects	49%

Base: 112

WHO SAYS TRADITIONAL STAFFERS CAN'T TRANSFORM INTO CLIENT/SERVER-ITES? OUR EXCLUSIVE SURVEY SAYS OTHERWISE.

THE BULK OF TRAINING WAS IN DATABASE, APPLICATION DEVELOPMENT AND LANs . . .

Application development	87%
Database	74%
LANS	59%
Groupware	36%
WANs	29%

. . . AND MOST OF THE TRAINING PROVIDED WAS INFORMAL OR VENDOR-ORIENTED.

On-the-job-training	83%
Specific vendor training	70%
Consultants	48%
Local schools/training organizations	40%
Use of newly hired client/server staff	36%

(multiple responses allowed) *Base: 90*

ALL IN ALL, RESPONDENTS SAID TRADITIONAL STAFFERS TRANSITIONED WELL TO THE NEW CLIENT/SERVER MODEL

1	2	3	4	5
2%	10%	36%	35%	16%

DON'T KNOW: 1%

Responses are based on a scale of 1 to 5, where 1 is very poorly and 5 is very well

Base: 112

WHAT'S NEW

A ROUNDUP OF NEW PRODUCTS AND REVIEWS

INSIDE

Tools to Unsnarl the Web

■ *By Christopher Lindquist*

A slew of new tools is out, designed to help your company become not just a World Wide Web onlooker but also a participant — with much less sweat than ever before.

Quarterdeck Corp., a Santa Monica, Calif., company known primarily for its memory-management products, has recently joined the fray with a tool suite designed to make home page creation as painless as possible.

The traditional way to create Web pages is to use the so-called Hypertext Markup Language (HTML). Users create Web documents in a standard word processor, then add HTML commands to format the text. But that technique isn't particularly easy.

WebAuthor ($149.95), the first in Quarterdeck's series, was designed as an add-in to Microsoft Corp.'s Word for Windows 6.0. It lets you type in the text for your page and then highlight sections to which you want to apply such features as hypertext links.

TEST DRIVE

QUARTERDECK'S WEB PRODUCTS

- WebAuthor lets users apply hypertext links to documents they create
- WebServer for Windows helps users start and operate a Web server
- InternetSuite tools include a browser, a message center for E-mail and a way to send and receive files

But while WebAuthor allows users to import and modify other HTML documents, it can choke on minor code variations, requiring users to modify the code directly.

In addition, WebAuthor supports only HTML 2. Other more complex tools support proposed pieces of not-yet standard HTML 3 as well as some nonstandard features of popular browsers such as Netscape from Netscape Communications Corp. Still, as an easy-to-use tool, WebAuthor is a good start. And Quarterdeck promises quick upgrades to HTML 3 as soon as the standard is set.

Once your page is complete, you can either upload it to your own Web server or send it to a Web service provider. Quarterdeck's WebServer for Windows ($129) is a two-floppy product that contains everything you need to start and operate a Web server on a standard Windows 3.1 machine, including support for password access, user text input on pages and "hot" graphic images that respond to mouse clicks.

While this Windows 3.1 product supports only 16 simultaneous accesses, it provides an easy way to launch internal Web pages over a network. Or you can launch your page into the global Web with the help of an Internet service provider.

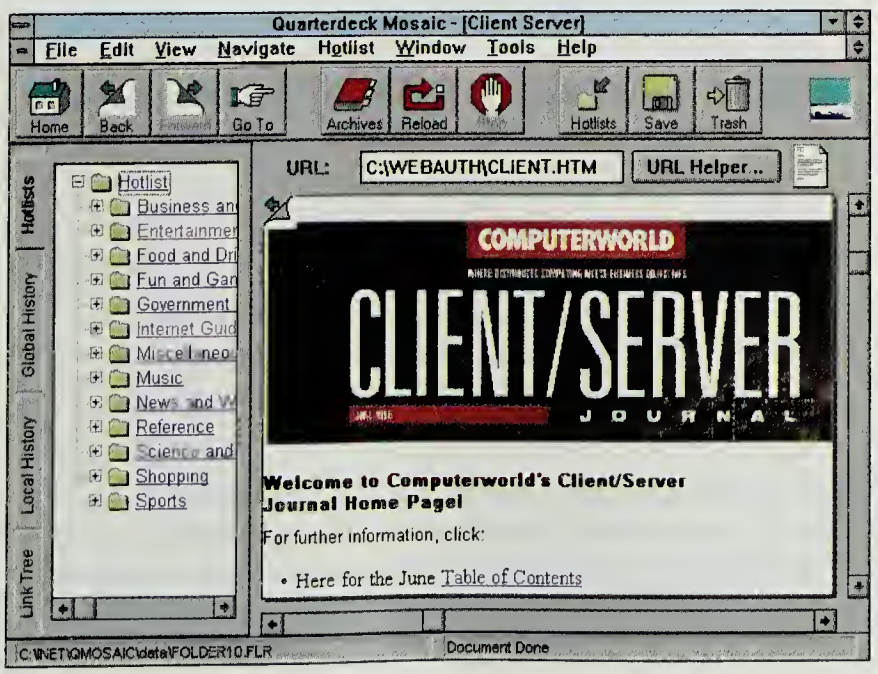
If you anticipate heavy traffic, you should consider a more industrial-strength Unix or Microsoft Windows NT server, such as those available from Netscape Communications or Sun Microsystems, Inc., both in Mountain View, Calif.

Getting to your page and others is also easy using Quarterdeck's InternetSuite ($79) of Web and Internet access tools. The suite includes the Quarterdeck Mosaic browser for Web access, the Quarterdeck Message Center for electronic mail and newsgroup information, Qterm for remote terminal connection and QFTP for sending and receiving files.

Improvements over other browsers become obvious upon installation. For starters, Quarterdeck Mosaic doesn't automatically replace any existing WINSOCK.DLLs (the layer between your applications and TCP/IP). Instead, it allows you to use your current file and a new QWINSOCK.DLL simultaneously.

Of course, as with all Web browsers and Internet tools, managers still don't have much control over what users can and cannot access. But this is an impressive collection nonetheless.

Quarterdeck, (310) 392-9851. ◪



Lindquist is technical editor of Electronic Entertainment *magazine.*

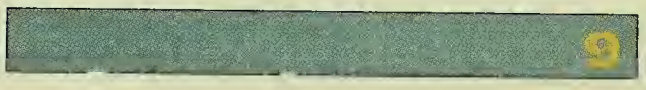
Sun Microsystems' Solstice

Sun Microsystems, Inc., Mountain View, Calif.
☎ *Phone (415) 960-1300*

EASE OF USE

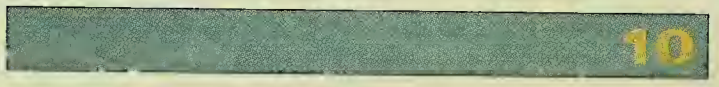
COMMENT: The views cut across different devices and protocols, but users want to associate more than one device name with a given element.

PROBLEM IDENTIFICATION AND RESOLUTION



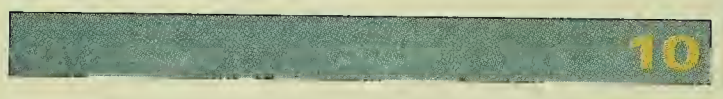
COMMENT: Alarm consolidation was a major reason for buying the product.

PRICE



COMMENT: Sun's $6,000 price tag came in well below competitors, whose prices start at $10,000 to $20,000.

SERVICE AND SUPPORT



COMMENT: These were high-profile accounts and so likely received optimal service.

RESPONDENT PROFILES: One to three years' experience. The largest had about 30 SunNet Manager licenses controlling a network of 1,000 routers in more than 100 cities. Key protocols for this user were X.25, SNA and NetBIOS. The smallest site had 10 SunNet Manager installations and more than 200 routers.

vs.

IBM's SystemView

IBM, Atlanta
☎ *Phone (800) 426-2255*

EASE OF USE

COMMENT: Users raved about the object-oriented Visual Launch Panel, which controls all products within SystemView.

PROBLEM IDENTIFICATION AND RESOLUTION

COMMENT: Integrates troubleshooting functions well but has inconsistencies in reporting and database connections.

PRICE

COMMENT: SystemView's "purchase a piece at a time" approach greatly reduced the risk in the full $100,000 investment.

SERVICE AND SUPPORT

COMMENT: These were high-profile accounts and so likely received optimal service.

RESPONDENT PROFILES: One to five years' experience. Mainframes were still in operation, with significant storage management facilities. Client/server architectures based on RS/6000s and PCs running OS/2 were the main downsizing platform. The largest site had 100 branch locations with 75 routers installed. Key protocols were based on Token Ring networks and included TCP/IP and SNA.

The Client/Server Journal Firing Line is an evaluation based on interviews with eight major users at corporate installations. The products under review are being used in a test environment. Ratings are based on user expectations on a 1-to-10 scale, where 1 is below expectations and 10 is above expectations. Ratings are listed in order of importance.

Something New Under (the) Sun and from IBM

IBM BROADENS NETWORK MANAGEMENT COVERAGE, WHILE SUN RETAINS FOCUS BUT GOES DISTRIBUTED

CSJ FIRING LINE

After years of battling head-to-head in the network management arena, IBM and Sun Microsystems, Inc. have parted ways. Sun is delving into network management, while IBM is focusing on breadth of coverage, including networks, systems, storage and other distributed management needs.

Both companies launched new initiatives this year. Sun's Solstice extends the reach of its SunNet Manager into distributed territory. It is more scalable than previous offerings and enables users to manage multiple SunNet consoles from a central location or distributed sites.

IBM's SystemView, code-named Karat, targets integrated systems and network management in a bundle that includes NetView, IBM's network management product for mainframe and Unix platforms. It will include multiple IBM systems and network management products.

According to the eight companies interviewed for this evaluation, the product sets substantially meet their larger goals. Solstice provides new functionality in distributed management; SystemView ties together a family of products that originally bore little resemblance to one another.

Participants were less satisfied on other fronts. Solstice, for instance, could go further in providing standardized management of network devices, they said. For its part, SystemView lacked consistency in data gathering and analysis among key elements of network and performance management, according to evaluators.

The two offerings definitely mark a parting of the ways for these competitors. Until it comes out with multivendor systems management tools of its own — a stated strategic direction — Sun seems to be leaving the field open to Hewlett-Packard Co.'s well-developed network and systems management platform and IBM.

A typical Sun user is network analyst Keith Finnie at BC Systems. Like many Sun users, Finnie has a large network, as well as multiple management platforms to coordinate. He manages about 30 SunNet Manager stations and 1,000 Cisco Systems, Inc. routers spanning 125 cities throughout British Columbia.

BC Systems is the chief network provider for the province's government ministries, and its management platforms are the key to efficient operation. And because the ministries can choose whichever network provider they want, Finnie's group must stay competitive with outside contractors. BC Systems is a member of the beta program for Solstice and has implemented SunNet Enterprise Manager, a component of Solstice that provides object-oriented, multiprotocol platform management.

BC Systems is also looking at Cooperative Consoles, an element of Solstice that coordinates data and views of the network among SunNet Manager workstations. But it is unlikely to add this software soon because the organization has written its own code to accomplish alarm routing, which passes alarm notifications among workstations.

Neither is it interested in Solstice's consolidated event-mapping capability, which gives each management workstation a common view of the network during problems. "We don't want to have the event maps of every individual SunNet Manager console change when something occurs. We already have distributed alarms," Finnie said.

Alarm consolidation and correlation are the key functions Finnie said he hopes to obtain with Solstice. A single view of the network, consolidating the effects of a device or software crash, is something Solstice can deliver, especially as it incorporates NetLabs, Inc.'s event management technology, which Sun has licensed.

BC Systems prefers Sun's products over IBM's and HP's because two years ago, Sun was the only vendor that offered distributed polling of network devices.

On the SystemView side, John Spiewak is a typical user. Spiewak is information systems director at TVSM, Inc., which publishes cable television guides. SystemView is aimed at installations that must manage both network and systems functions in a client/server environment. IBM users who already have experience with IBM's diverse systems and network management products are the first to see the advantages of the new integrated approach.

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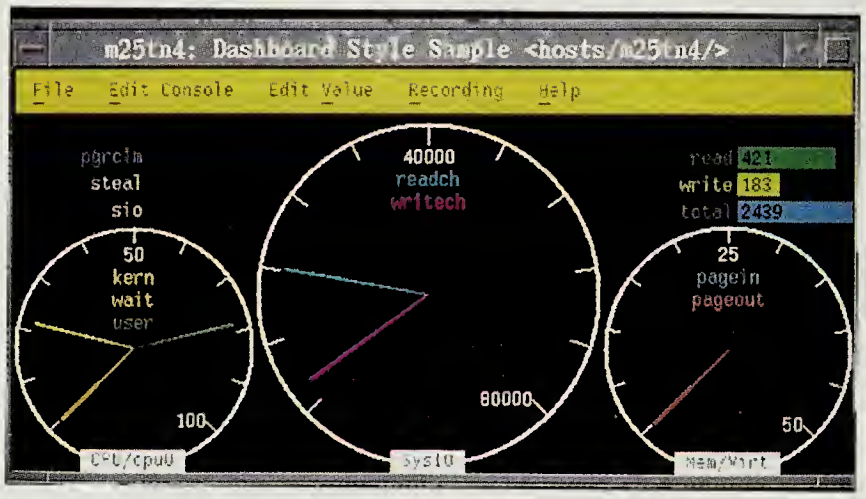


KEY FEATURES: SYSTEMVIEW

- **NETVIEW FOR AIX:** Network management platform based on using a single console to troubleshoot a distributed network.
- **SYSTEMS MONITOR FOR AIX, SOLARIS, HP-UX:** Provides distributed fault and performance management, allowing node-based intervention and sending filtered information to the central management platform.
- **LOAD/LEVELER/6000 AND JOB SCHEDULER:** Schedules work on different processors in a distributed network.
- **ADSTAR STORAGE MANAGER/6000:** Provides enterprisewide backup and storage for PCs, workstations and LAN file servers.

Continued from page 69

For example, TVSM uses IBM storage devices, a mainframe, an RS/6000 and an OS/2 client/server LAN. To manage them, Spiewak uses all the IBM management tools.

SystemView takes the individual controls each management tool requires and rolls them up into a single operations platform. This has allowed the company to stop worrying about how certain management tools work and focus more on managing the devices. It also requires less manpower.

"We don't have a large network of hundreds of routers, but NetView provides what we need, along with the other operations tools," Spiewak said.

The eight companies interviewed for this evaluation included firms in these areas: government, telecommunications, entertainment, transportation, distribution, petroleum and manufacturing. The format was designed with help from Howard Rubin and Associates and Technology Investment Strategies Corp.

EASE OF USE

Object orientation is a key part of both Solstice and SystemView. Sun uses it to achieve alarm consolidation, which simplifies the job of identifying trouble on the network.

IBM chose a two-phased approach to object orientation. Phase 1, which is already implemented, is an object-based control panel for all products and functions. The control panel represents the tool controls as objects. In Phase 2, due in the fourth quarter, IBM will build object orientation into the individual products to increase consistency and ease of use. The tools will present themselves as objects, allowing consistency among their features for data collection and reporting to the control panel.

The SunNet Enterprise Manager offers views of network events that cut across different devices and protocols. But users want to be able to associate more than one device name to a given element. For example, a router may have multiple types of traffic or multiple protocols. Things would be simpler if the management station could show each user only the traffic type or protocol relevant to him.

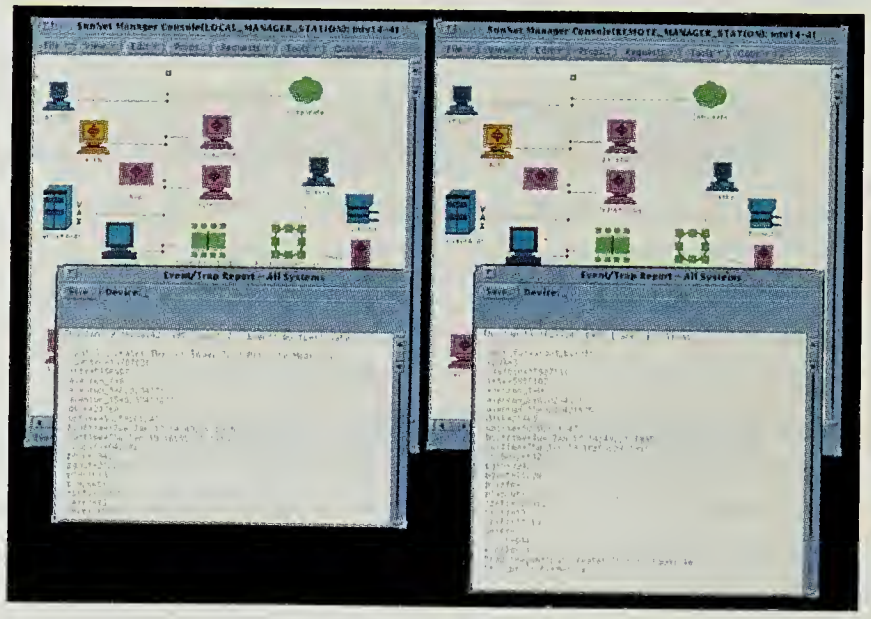
GOVERNMENT: "The product allows polling of geographically distant systems but doesn't give us information from all the different sources. It consolidates them at a central location."

IBM users cited the object-oriented Visual Launch Panel, which controls all products within SystemView, as the best feature and greatest enhancer of ease of use.

DISTRIBUTOR: "It's a lot of work to install and operate the SystemView products separately. [SystemView] allows a single installation via a compact disc and a single point of control. Before, I had to be concerned about knowing which product operated in what way. Now I have a more task-oriented approach. I'm more focused on operations management than product management."

PROBLEM AND RESOLUTION

Despite different approaches, both product sets at their core



KEY FEATURES: SOLSTICE

- **AUTOCLIENT:** Allows automatic setup, updating and reinstalling of network systems from a single site.
- **COOPERATIVE CONSOLES:** Ties together management consoles, allowing multiple views of network events at distributed locations.
- **ENTERPRISE MANAGER:** Object-oriented multiprotocol management platform, allowing distributed large-scale network management.
- **SUNNET MANAGER:** Distributed network management platform for specific locations.

still provide the most significant function of network and operations management: troubleshooting. The ability to detect, investigate and resolve problems has been greatly enhanced in both. Solstice's alarm consolidation ability was cited as a key plus.
GOVERNMENT: "If a node fails, it can set off hundreds of devices in our network, each of which will send information to the operator. Solstice consolidates these events and provides a single alarm notification identifying the problem across multiple management stations and devices."

SystemView integrates different troubleshooting functions well but was inconsistent in its reporting and database connections. That is, management products for different functions still collect and report data in different ways.
ENTERTAINMENT: "The products within SystemView deal with data in different ways. I'd like to see [IBM] make it easier for them to share data. That would help us see where the data came from and what it means."

Despite the inconsistencies, the users still obtained the productivity benefits of a single point of access for troubleshooting and management control.
ENTERTAINMENT: "We were able to eliminate a shift of operations staff because we no longer have to deal with individual products."

PRICE

The evaluators saw both products as bargains. Solstice's $6,000 price tag was well below competitors' prices. Sun pleased users by offering Solstice's advanced features at the same price point. IBM users, meanwhile, said they appreciated the ability to buy only those aspects of SystemView they wanted.
GOVERNMENT: "If a single workstation is all you need to manage your network, then it's more of a horse race. But with hundreds of routers and thousands of users, you can't beat the price for Solstice."

SystemView's "purchase a piece at a time approach," reduced the risk in the $100,000 investment for the full program. Users bought only those parts of SystemView they wanted, with the option to add more. Each piece ranges from a few hundred to a few thousand dollars, with NetView coming in at about $10,000.

In addition, SystemView users were migrating or had migrated from a mainframe management platform, which costs nearly 10 times the price of the distributed products.
MANUFACTURER: "It's easy to show return when you only have to justify the investment a piece at a time."

SERVICE AND SUPPORT

All users received top-notch support — a sign that these are key, high-profile accounts for the new offerings. In fact, users reported getting better support for these products than for the systems they already have. Sun users in particular were pleased by the increased attention their use of Solstice brought them.
PETROLEUM: "We're in the premium program for service and support. When we call, the response from IBM is immediate." ◩

Written by Michael L. Sullivan-Trainor, research director of electronic messaging and Internet applications at International Data Corp.

IBM RESPONDS

INCONSISTENCIES AMONG SYSTEMVIEW PRODUCTS

In the next two years, IBM will continue to integrate SystemView's various interfaces, using object-oriented technology to make management data easily available to every application and feature that needs it, regardless of platform.

ALARM CONSOLIDATION

Through object orientation, IBM will permit customers and applications to interact with alarms in a protocol- and database-independent way, offering a single logical view of log data.

PROPRIETARY MIBS

IBM is working very closely with the Internet Engineering Task Force to achieve some standard Management Information Bases (MIB) and is pursuing agreements with other vendors on additional architectures — with the intent of having them standardized.

UPGRADE OPTIONS

Very soon, IBM will make available a new client/server version of the NetView feature of SystemView for AIX. Benefits will include enhanced performance; better ease of use; support for additional operators; enhanced security features; and new event correlation and automation capabilities.

SUN RESPONDS

NAMING CONVENTIONS

Users can associate more than one "name" to a given element through basic operating system capabilities (aliasing in the host file or database). Any device can have multiple names that correspond to one device address. Therefore, the names can be represented as separate devices within Solstice Enterprise Manager. This capability, available with Solstice SunNet Manager 2.2.2, will be added to the Enterprise Manager.

ALARM CONSOLIDATION

The current Alarm Manager application already stores all alarms in a single log. The alarm log data can also be simultaneously written to an external relational database for further manipulation or storage. The Alarm Manager can provide a filtered, sorted or collective display of all alarms. The Log Manager application permits data and/or alarm information to be written to individual logs.

PROPRIETARY MIBS

Solstice Enterprise Manager includes special agents to extract critical data from servers, desktops, etc., not just basic Simple Network Management Protocol (SNMP) statistics. Solstice Partners provide enhanced management capabilities through this agent technology.

MULTIVENDOR SUPPORT

Sun is committed to delivering heterogeneous, enterprisewide network and systems management through Solstice. Sun will produce interfaces for many of the Solstice products for Windows.

From Switching Tools to Security Software

DESKTOP ATM TOOLS

WHITETREE WS3000 WORKGROUP SWITCH

Whitetree Network Technologies, Inc., Palo Alto, Calif.

WHAT: The WS3000 is a 25M bit/sec. Asynchronous Transfer Mode (ATM) switch for workgroups and desktops. It is a stackable, high-performance switch that provides automatic adaptability between switched Ethernet and ATM to the desktop, providing an initial step in the migration path to ATM-based networking.

WHERE: Available for Ethernet and 25M bit/sec. ATM environments. An optional high-speed stacking bus provides switch extensibility. Network Option modules for copper and fiber 155M bit/sec. ATM modules provide campus and server connectivity.

WHEN: Available now.

HOW MUCH: Priced at $650 per port and $7,795 for 12 ports of switched Ethernet and ATM25. Option modules are priced starting at $995.

A fiber version of the Network Option Module will be available for $1,395. An ATM25 Peripheral Component Interconnect bus network interface card costs $395.

USER FEEDBACK: Stanford University is testing the switch in its ATM-based student dormitory computer access network on its Palo Alto, Calif., campus, according to Dale Harris, executive director of the institution's Center for Telecommunications.

The university is installing a test network to explore the possibility of providing students with access to server-based multimedia data, including video and audio recordings of class lectures. Students will be able to play back the recordings from the servers or download the information to workstations in their dormitory rooms.

The Whitetree product provides some significant advantages to this particular project, according to Harris. It will allow the university to use existing network wiring, and it will be less expensive than full-blown 155M bit/sec. ATM.

Also, adapter boards for diverse desktop platforms such as PCs and Macintoshes are expected to arrive in 25M bit/sec. ATM technology sooner than in the higher-speed technology.

Harris said he does not foresee the lower-bandwidth ATM being a serious performance obstacle.

"We've done quite a bit of work with ATM, and so far we haven't been able to get the 155M bit/sec. technology on workstations to run much faster than about 35M bit/sec.," Harris explained. "Twenty-five megabits per second is enough for what we're doing, which is audio, video and file transfers of around 1G byte."

PHONE: (415) 855-0855

NEW PRODUCTS

NETWORK MANAGEMENT SYSTEMS

DISTRIBUTED SNIFFER SYSTEM 3.0

Network General Corp., Menlo Park, Calif.

WHAT: The latest version of the vendor's well-known network management software now supports high-speed Fiber Distributed Data Interface (FDDI) in a distributed system. The FDDI capabilities complement Sniffer's existing support. Distributed Sniffer System 3.0 can also be integrated with major network management systems.

WHERE: Version 3.0 supports Ethernet, Token Ring, wide-area networks and FDDI.

WHEN: Available now.

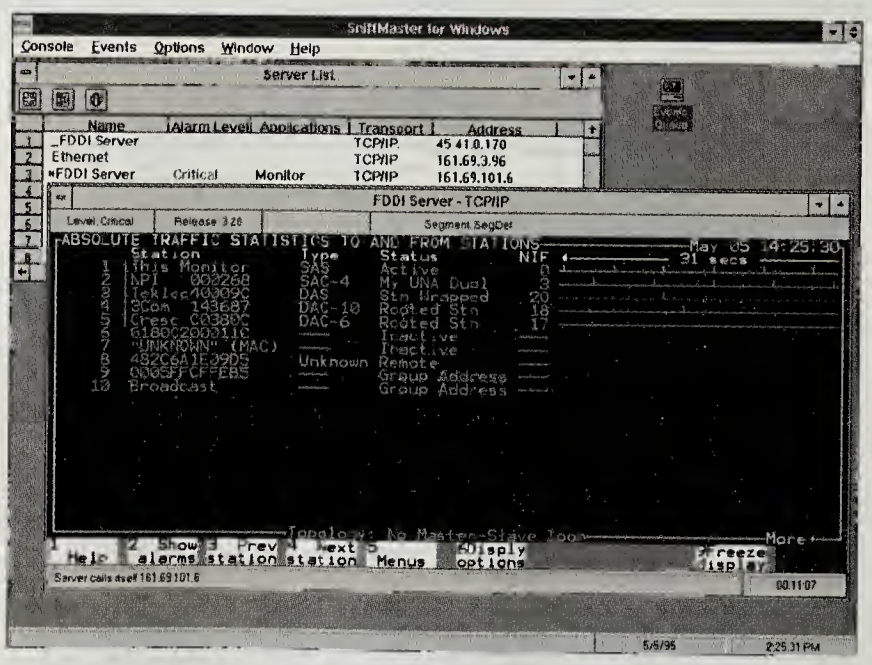
HOW MUCH: Pricing for Ethernet is $7,495 to $11,995; for Token Ring, $8,495 to $12,995; for an internetwork, $8,495 to $12,995; and for FDDI, $16,995 to $20,495. Consoles for Unix cost $4,995; consoles for Windows cost $3,995.

USER FEEDBACK: At the consumer long-distance division of AT&T Corp., "the FDDI network is essential," said Dennis Colligan, network manager at the Piscataway, N.J., unit. "If that ring goes down, we lose 1,000 users. It's a huge advantage for us that the FDDI monitoring is distributed now."

The model also enables network administrators to take a more proactive approach to net management.

"Because of the new distributed feature, I find myself doing a lot more exploring around the network," Colligan said. "That way, Sniffer not only flags problems on the FDDI ring, but it also becomes a learning tool for us. We end up learning more about the FDDI protocol because it's easier to look into the little things."

PHONE: (800) 764-3337



Distributed Sniffer System 3.0 lets network administrators manage fiber networks

LAN SWITCHING HUBS

POWERHUB 4000
Alantec Corp., San Jose, Calif.

WHAT: The PowerHub 4000 series — the newest addition to Alantec's PowerHub family of multiprotocol switching hubs — is intended to bring the company's intelligent switching, bridging and routing capabilities down to the workgroup and desktop levels.

The Model 4000 will enable network managers to bring multiprotocol and multilayer virtual LAN support to workgroups and high-end desktop workstations while remaining consistent with Alantec's other network products.

The PowerHub 4000 series will be available in five configurations, providing 12 Ethernet connections as well as several options for high-speed links into 100M bit/sec. Ethernet and Fiber Distributed Data Interface (FDDI) connections.

WHERE: All five models will have full-featured bridging and routing protocols for IP, IP Multicast, Novell, Inc. IPX and AppleTalk.

WHEN: Most models are available now. Model 4005 is due in September.

HOW MUCH: Pricing for the PowerHub Model 4001, 12 Ethernets only: $6,950; for the PowerHub Model 4007, 12 Ethernets, dual TX 100M bit/sec. Ethernets: $7,950; for the PowerHub Model 4009, 12 Ethernets, one TX and one FX: $8,450; for the PowerHub Model 4008, 12 Ethernets, dual FX 100M bit/sec. Ethernets: $8,950; and for the PowerHub Model 4005, 12 Ethernets, one FDDI DAS: $9,950.

USER FEEDBACK: According to users, the Model 4000 will greatly simplify the process of upgrading standard 10M bit/sec. networks to faster 100M bit/sec. ("fast" Ethernet) speeds.

"The 4000 is a low-end, easy solution to implement 'fast' Ethernet into current configurations without redoing the whole network," said Michael DeShazo, senior engineer at Hayes Computer Systems, Inc., a systems integrator in Tallahassee, Fla. Particularly useful is Alantec's support of many protocols, he said, as is the addition of switching capabilities within the hub.

"Since they have not just the switching technology but also the ability to bridge and route at the same box, you can create switching configurations you never could using just a switch and router," DeShazo added.

By extending the PowerHub functionality down to the workgroup and desktop levels, DeShazo said, the Model 4000 can eliminate many of the throughput bottlenecks that frequently accompany bandwidth-hungry applications such as video, heavy-transaction databases or database replication procedures that are used in products such as Lotus Development Corp.'s Notes.

"This allows you to centralize certain servers that need more bandwidth and connect them to the 4000 and immediately see dramatic improvement in the server," DeShazo said.

PHONE: (800) 252-2683

SECURITY PACKAGES

KANE SECURITY ANALYST 2.0
Intrusion Detection, Inc., New York

WHAT: This software can report on six areas of network security to assess the security status of a Novell, Inc. NetWare 3.x or 4.x LAN. For example, it will examine password strength (whether it's sufficiently arcane and thus unguessable) and whether users are changing their passwords frequently enough. It also assesses access control, account restrictions, system monitoring, data integrity and data confidentiality.

WHERE: Runs in NetWare 3.x and 4.x environments. Requires Windows 3.x.

WHEN: Shipping now.

HOW MUCH: The cost is $495 per file server.

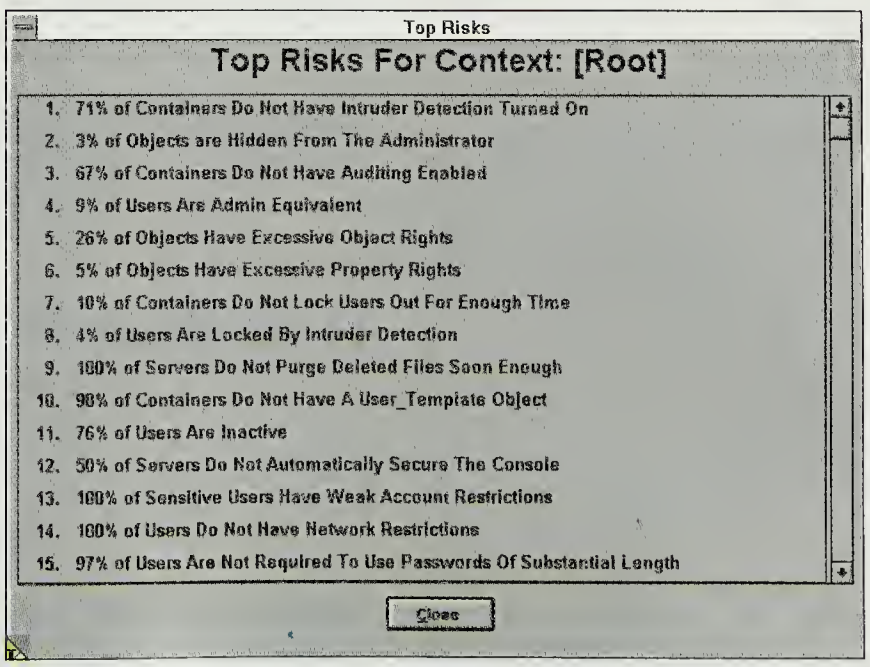
USER FEEDBACK: "One of the most attractive aspects of the product is that it can evaluate my entire network security in one report," said Jim Hadfield, chief information officer of the International Center for Entrepreneurial Development, a Cypress, Texas-based holding company for printing and communications businesses. "I like that it can give me a security grade on a per-server basis." The center has 70 servers worldwide.

At one point, Hadfield discovered through the Security Analyst that one of his network administrators, who was inexperienced at using NetWare 4.x, had become confused by the drag-and-drop network controls and accidentally given everyone in the department supervisor rights.

"The tool alerted me to the excessive rights and enabled me to find where they'd come from," Hadfield said. "You can go to an inheritance rights filter and see everyone on the NDS trees and whether or not their inherited rights are filtered to block their showing up on the NDS trees."

The Kane Security Analyst is not a real-time monitor, "so it isn't going to pick up a hacker intruding over the wire," he added. But it will alert administrators to possible insecure spots on the network.

PHONE: (212) 348-8900



Intrusion Detection's Kane Security Analyst 2.0 pinpoints security weaknesses in an organization's NetWare LAN

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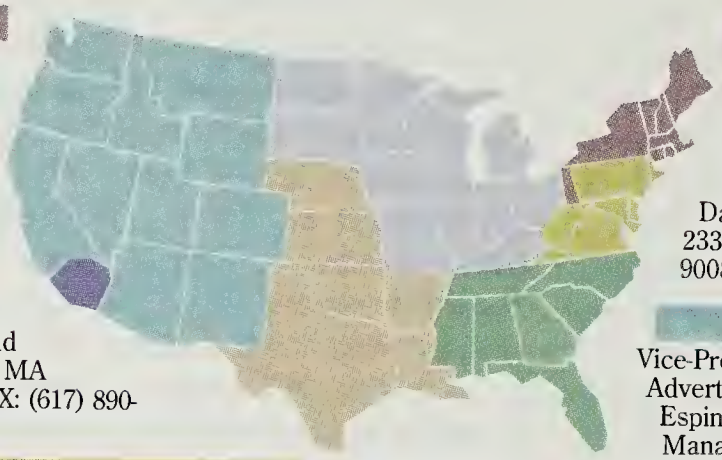

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The Back Page

THE 5TH WAVE

"THIS IS YOUR GROUPWARE?! THIS IS WHAT YOU'RE RUNNING?! WELL, HECK – I THINK THIS COULD BE YOUR PROBLEM!"

Conferences

■ INFORMATION SUPERHIGHWAY SUMMIT
Santa Clara, Calif., Sept. 11-14
Gain insight into the future of the National Information Infrastructure. Contact: IDG World Expo, Framingham, Mass. (508) 879-6700 or E-mail comnet@idgwec.com.

■ NETWORKS EXPO DALLAS
Dallas, Sept. 12-14
Visit the Client/Server Pavilion to meet networking solutions providers and attend sessions. Contact: Jay Gorga, Networks Expo, Fort Lee, N.J. (801) 655-8024.

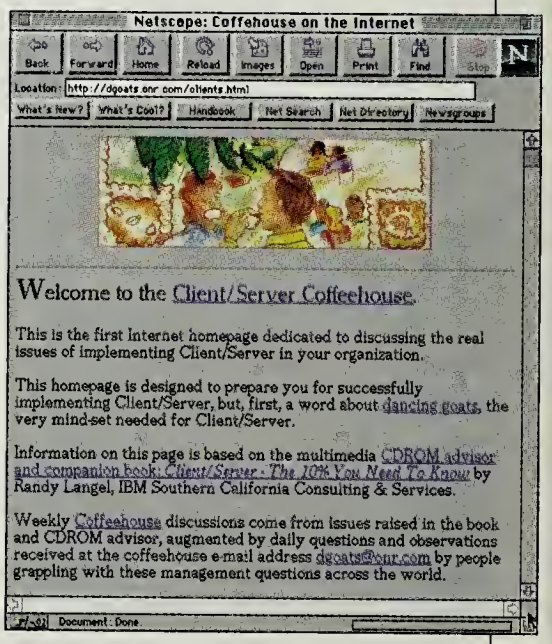
■ CLIENT/SERVER ECONOMICS SUMMIT
Washington, Sept. 18-20
Learn how to get the greatest return on your client/server investment. Contact: Patrice Rapalus, conference director, San Francisco, Calif. (415) 905-2267.

■ CLIENT/SERVER SOLUTIONS '95
Toronto, Sept. 25-27
Contact: DCI, Andover, Mass. (508) 470-3870.

■ SYMPOSIUM '95
Lake Buena Vista, Fla., Oct. 9-13
This examines the dynamics of the IT industry and plans for the next five years. Contact: Ashley Pearce, Gartner Group, Stamford, Conn. (203) 316-6757.

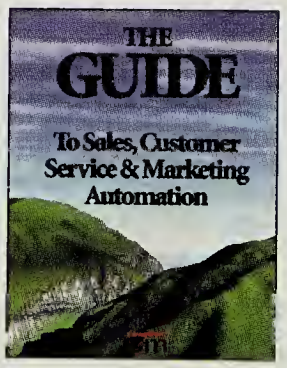
■ THE DARK SIDE OF DISTRIBUTED COMPUTING
Boston, Oct. 18-20
Contact: Cambridge Technology Partners, Cambridge, Mass. (617) 374-2062 or E-mail mbeck@ctp.com.

Coffee, Tea or Client/Server?



"Come right in, grab a cup of coffee and join us in the latest discussions regarding implementation of client/server in your company." That invitation is from Randy Langel, author of *Client/Server: The 10% You Need to Know* and creator of the Client/ Server Coffeehouse home page. Still under construction, the home page will post recommended articles and interesting products. But already, 1,300 people a month are pouring the java and browsing through the responses to questions submitted about client/server or reading Langel's tips such as "Every LAN server costs an average of $3,500 per month to maintain." Langel will soon publish an electronic newsletter to hold all the questions. Address: http://www.onr.com/-clients.html. E-mail comments to dgoats@onr.com.

Book Review



■ GUIDE TO SALES, CUSTOMER SERVICE AND MARKETING AUTOMATION,
Barton Goldenberg

Good news: Vendors of sales automation software are moving away from simplistic contact management functionality toward sophisticated business objectives such as team selling, opportunity management and consultative selling. But unmet promises and flawed designs are still prevalent. So says Barton Goldenberg, president of Information Systems Marketing and author of the fourth edition of the *Guide to Sales, Customer Service and Marketing Automation*. The book offers a ranking of sales software packages, a step-by-step process for choosing and implementing sales software and a summary of industry developments. It comes in three versions: a 400-page $995 edition; an abbreviated $495 version; and a vendor edition for $1,495. To order, call (800) SFA-GUIDE.

CLIENT? SERVER?

HOW DO I CHOOSE THE RIGHT TOOL?

Choosing the right client/server development tool is a big decision. So take some advice from industry analysts like Judith Hurwitz of Hurwitz Consulting Group and Ed Acly of IDC: Consider the applications you intend to build. Then select a tool to grow with your needs.

We've got the answers to help you pick.
In a new Cognos report, *The Right Tool for the Job*, the experts agree: Whatever you're building, match the tool to the task. It's decision support now. But it might be quickly scaled-up to a comprehensive transaction-intensive business application soon. So prepare yourself with the tool that builds and supports both.

Choose the tool that gives you choices.
Axiant® is the analysts' answer – it gives you the best of both worlds. It's a graphical application development solution with a robust 4GL engine and built-in decision support tools. Axiant applications deliver the Windows-based interface you need and the self-service decision support users demand. Plus support for transaction-intensive applications you can deploy on client *or* server.

Get The Right Tool Kit. Right now.
For more answers, call for your free Right Tool Kit. It includes *The Right Tool for the Job*, featuring insight from Hurwitz, Acly and others. Along with an Axiant White Paper, the Cognos interactive CD-ROM, and full products details. Call today. See how choosing the right client/server tool starts with asking questions. And ends with the tool that gives you answers.

1-800-365-3968, EXT. 2070

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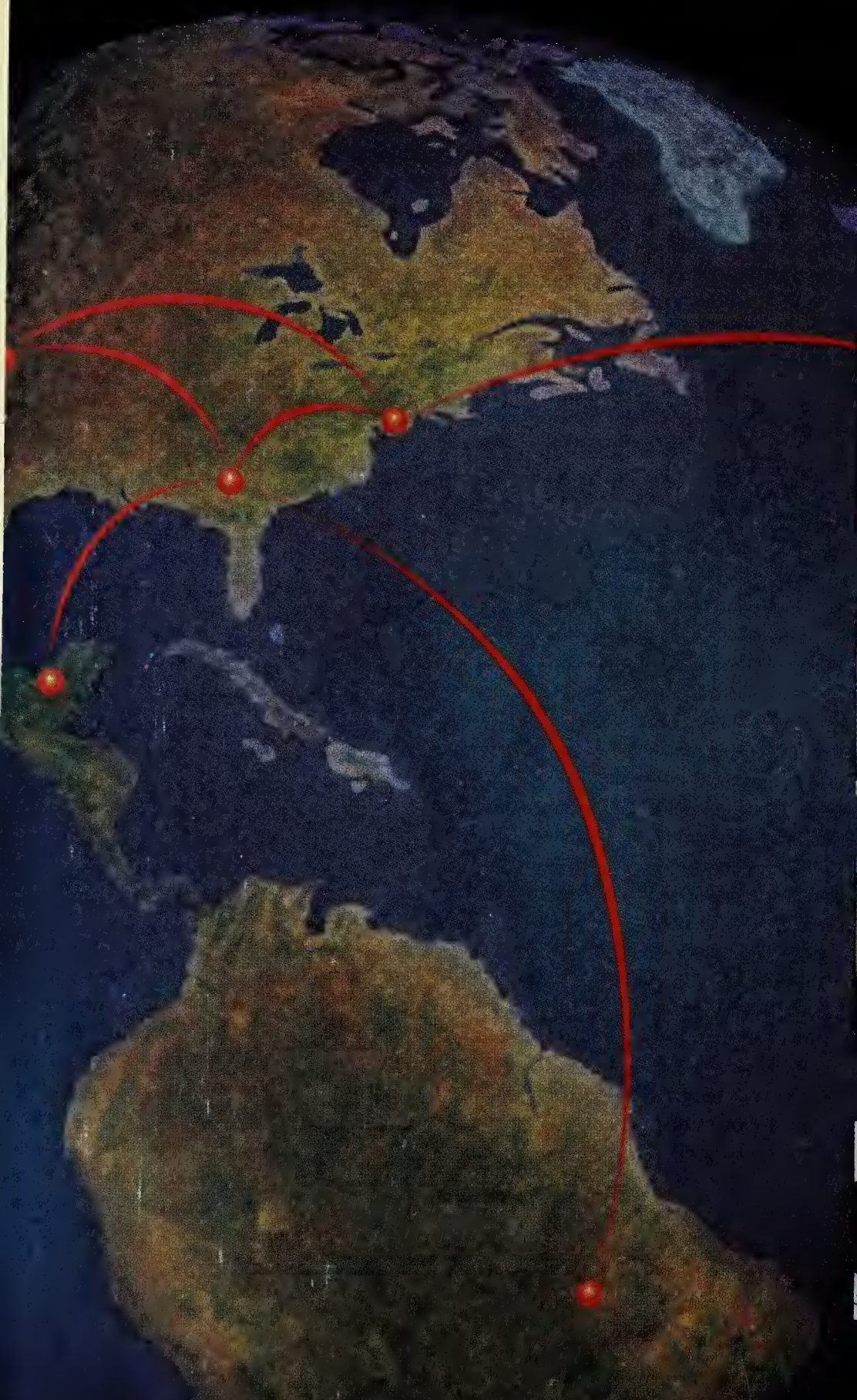
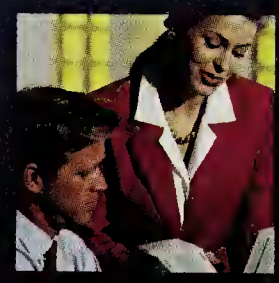


For the CEO: *Tivoli® applications make the company more competitive by removing systems management as a barrier to success.*

For the CFO: *Tivoli applications improve the company's bottom line by controlling the escalating costs of managing client/server systems.*

For IT Managers: *Tivoli applications make it easier and more economical to manage client/server systems, and provide mainframe-like service levels.*

For System Administrators: *Tivoli applications let you quickly administer, configure and control all elements of a client/server environment, including the applications themselves.*



For Application Developers: *Tivoli lets you build "management-ready" client/server applications which can be administered in a consistent way.*

Systems management solutions from Tivoli can help an enterprise derive the benefits of client/server computing. For user and system administration, to software distribution and resource monitoring, and now, management of your applications as well — Tivoli software products and services can help you take control of your distributed systems. And start making client/server work.

Tivoli

Making Client/Server Work™

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